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HENRY TROTH

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HENRY TROTH,

Founder of the Philadelphia College of Pharmacy.

BY JOSEPH P. REMINGTON.

Henry Troth, to whose enterprise and foresight the Philadelphia College of Pharmacy owes its existence, was born in Talbot County, Maryland, September 4, 1794. He was the son of Samuel and Ann Berry Troth, his ancestors being among the early settlers of Maryland. After acquiring such education as circumstances permitted, he came to Philadelphia in 1812, and was apprenticed to Jeremiah Morris, a druggist, in business on the north side of Market Street, below Eighth.

It was toward the close of the war of 1812 that Henry Troth became satisfied that the time had come for him to assume graver responsibilities, and on April 1, 1815, he formed a partnership with his brother-in-law in the wholesale drug business, under the firm name of Henry Troth & Co., locating the new business upon the south side of Market Street, a few doors below Seventh. In 1816 he was united in marriage to Henrietta Henri, of Philadelphia. He had been in business for himself but six years, when the University of Pennsylvania conceived the idea of teaching pharmacy to young apothecaries, and conferred the degree of Master of Pharmacy upon sixteen apothecaries already established in business. This action aroused the independent and progressive spirit of Henry Troth, and he, with his friend, Peter Lehman, called upon the druggists of the city of Philadelphia to defend their right to educate their own assistants, and, the project having been favorably received, a meeting was held in Carpenters' Hall, February 23, 1821. The action taken at

this meeting resulted in the establishment of the Philadelphia College of Pharmacy.

In the meantime the business on Market Street became prosperous, and in January, 1826, Samuel F. Troth, a younger brother of Henry, purchased the interests of Henry's brother-in-law, and thus the brothers became associated in business. As an illustration of his energy and enterprise, in 1835 he built the first five-story store on Market Street; this was regarded at the time as a very advanced step; but Mr. George W. Carpenter, at the northeast corner of Eighth and Market Streets, not to be outdone by a business rival, added two stories to his four-story building, and thus secured the lead in elevation. This incident furnishes a glimpse of the competition amongst druggists more than half a century ago.

Henry Troth's activity was not limited, however, to the demands made upon him by the college and drug business; he had a great fondness for literature, and in 1813 he became associated with Joseph Cooperthwaite, Benjamin M. Hollinshead, Joseph A. Needles, Peter Thompson, Edward Haydock, Samuel Stackhouse, Warwick P. Miller, Thomas Yardley, Watson Jenks, and James Hutchinson, who organized the Philadelphia Literary Association. This became one of the leading societies of its kind, embracing within its membership many of the prominent citizens of Philadelphia, and was an active organization for over thirty years.

Henry Troth was a member of the Orthodox branch of the Society of Friends, and philanthropy and the cause of the oppressed had in him an able champion, for we find him interested in a number of organizations, and for thirteen years he was treasurer of the Pennsylvania Society for the Abolition of Slavery. In addition to this, he served as one of the managers of the Colonization Society, the Children's Asylum, the Almshouse, and the Provident Society.

Through the active period of his life he was one of the Guardians of the Poor, of Philadelphia, a Trustee of Girard College, and one of the Board of Managers of the House of Refuge, from the first year of its organization. The education of the young was always a prominent interest with him; he was one of the organizers of the Apprentices' Library, which still continues its useful work in the community. In the higher field of intellectual activity he was known as a valuable member in the Executive Board of the Philadelphia Museum and Franklin Institute. In commercial and finan-

cial circles, Henry Troth was well known as a manager of the Schuylkill Navigation Company from 1825, and he was also one of the Directors of the United States Bank. From 1827 to 1836, he was a member of Common Council of the City of Philadelphia, and for four years was president of that body.

During the time of his connection with public affairs he became much interested in the use of illuminating gas for lighting the city. This project met with violent opposition from many prominent citizens of Philadelphia. It was gravely contended by engineers and experts that the city would be in danger of being blown up, for the explosive properties of a mixture of this gas and air was then well known, and another objection which was freely urged, was that the water which was conducted by underground pipes through the city, would be contaminated by the pipes conveying the gas in their immediate vicinity. Henry Troth contended strongly against these objectors, and his views were soon sustained, for a company, chartered for the purpose of making illuminating gas, erected works, laid pipes, proved that the grounds of opposition were absurd, and finally sold the works to the city at an advance of 25 per cent.

Henry Troth's progressive spirit was shown in 1819 in his efforts to burn anthracite coal, he being one of the first to attempt it in the city of Philadelphia. The hardness of the "stone coal," as it was called in those early days, seemed to be an insuperable obstacle; this hardness, as is well known, is now recognized as one of its greatest advantages. It is hardly necessary to say that he overcame the difficulty of burning anthracite, and we can well imagine his satisfaction and enjoyment, in after years, in seeing this important product become one of the great sources of wealth of the Commonwealth.

The life of Henry Troth, viewed from the standpoint of the number of years that he lived, was not a long one, for he died May 22, 1842, in his 48th year; but his ceaseless activity, wonderful foresight and correct judgment, caused his labors to be appreciated long after he was laid to rest. In this connection, the words of a contemporary and distinguished professor of the College, written immediately after his death, in an address delivered to the graduates of the College, may appropriately close this brief sketch:

"An individual, once a member of our body, prominent with others, was among the first in his endeavors to promote its success-

ful establishment. In this country it was a new and untried undertaking, but the success with which it has been crowned has long since clearly exhibited the advantages expected by its founders. A foresight of the future, an anticipation of the growing wants of the profession, the necessity of preparation to meet the demands of the community, originated the enterprise. But it required unceasing vigilance, inexhaustible perseverance, widespread influence and unwearied personal attention. For all these our lamented Vice-President Troth was distinguished; he boldly took his stand in favor of improvement, and no difficulties drove him from his path, no disappointment diminished the firmness of his determination to accomplish it. His hope was high and he had the faculty of infusing it into all within his circle. His manly bearing, his practical intelligence, his tones of encouragement and decided liberality, communicated power, and it was wielded for the advancement of this, his favorite project. In speaking of him thus, I detract nothing from the merit of those who stood by him and aided him. I praise him because he is no longer with us, and bring his deeds before our minds, because it is a melancholy enjoyment to dwell upon his memory, more especially in connection with the present ceremonies, in which so often he stood conspicuous. His mantle is among us, and will continue to cover, I trust, many an eminent successor."

SOME FURTHER OBSERVATIONS ON THE STRUCTURE OF SANGUINARIA CANADENSIS.

By Edson S. Bastin.

In *The Pharmacist* for July, 1885, the author published an article on this plant, in which he described the secretion cells and laticiferous tissue of the rhizome.

The following language was used:

"The laticiferous tissue is an interesting subject of study from the morphological standpoint, as in the rhizome it shows every gradation of development from simple, isolated resin- or secretion-cells, through those that are clustered in rows of two or three and those that form an irregular and long chain, but still have a distinct cellular character, to those which form distinct tubes."

A remark of De Bary in which he states that Sanguinaria contains no proper laticiferous tissue, but only secretion cells, led to

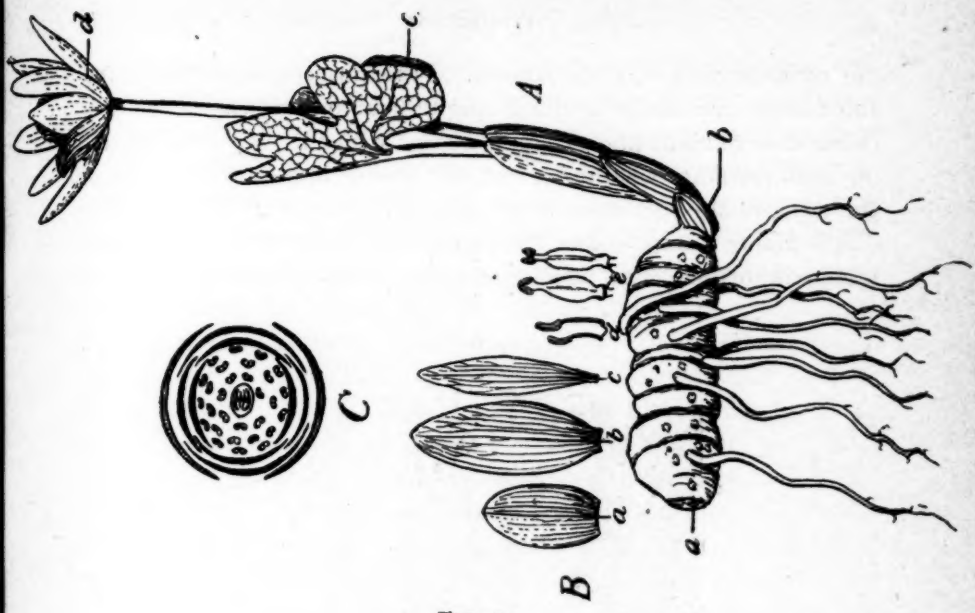

FIG. 1.

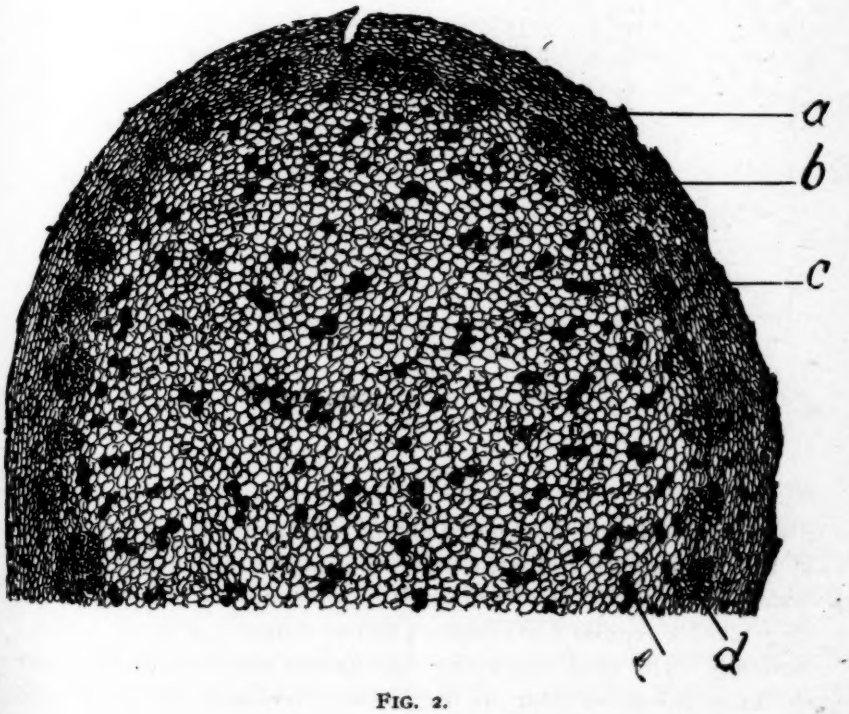

FIG. 2.

this re-investigation of the subject. Fresh materials were procured and a large number of sections, longitudinal and transverse, of the rhizome were made and carefully studied with the view of ascertaining with certainty whether or not milk-tissue, in the proper sense of the term, really does exist in the rhizome.

The red or orange-colored secretion is without doubt chiefly contained in distinct cells, which are either isolated or connected into

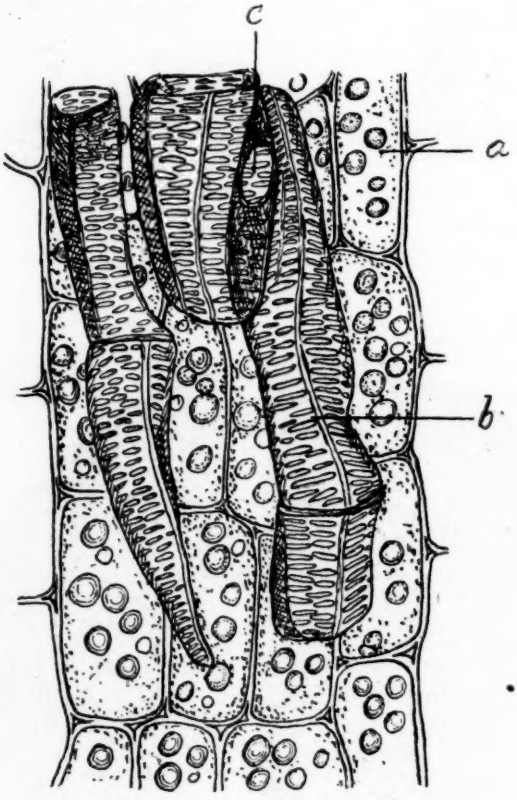

FIG. 3.

irregular chains and distributed among the parenchymatous tissues of the middle bark and large pith. But in the inner portion of the middle bark, and in the inner bark, occur chains of cells which are longer, more regular and contain a yellow rather than an orange-red secretion. The cells composing the chains are also much narrower and more elongated than are the ordinary secretion cells. Among

these rows it is impossible in most instances to demonstrate any communication between the cells. The transverse partitions between the cells are in fact imperforate. In a few instances, however, particularly in the inner layer of the bark, there is demonstrable connection between the secretion cells of the chains, which thus form a true laticiferous tissue, essentially like that occurring in many other

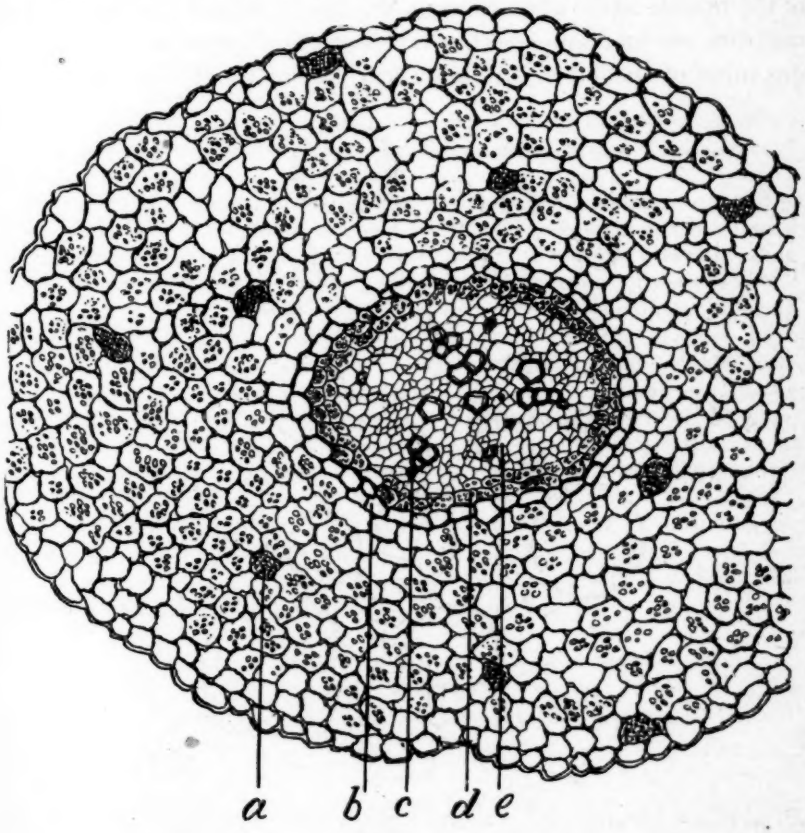

FIG. 4.

of the Papaveraceæ, though of course much less complex in its development. It is seldom the case that these milk-tubes are more than a dozen cells long, and they are seldom branching. In fact we find in this plant the form of laticiferous tissue called "complex," or "reticulate," only in the most rudimentary stages of its development. It plays a very subordinate part in holding the secretions of the plant; but still, to the morphologist it is highly significant, as

showing the relationship existing between secretion cells and complex laticiferous tissue.

That the secretion cells contain resins beside the alkaloidal principles present in the drug, is clearly evidenced by tests. Moreover, it seems probable that the salts of sanguinarine are more abundant in the large orange-red secretion cells of the pith and outer portion of the middle bark, while those of the closely related alkaloid, chelerythrine, are more abundant in the smaller yellow cells and laticiferous tubes of the inner bark and inner part of the middle bark.

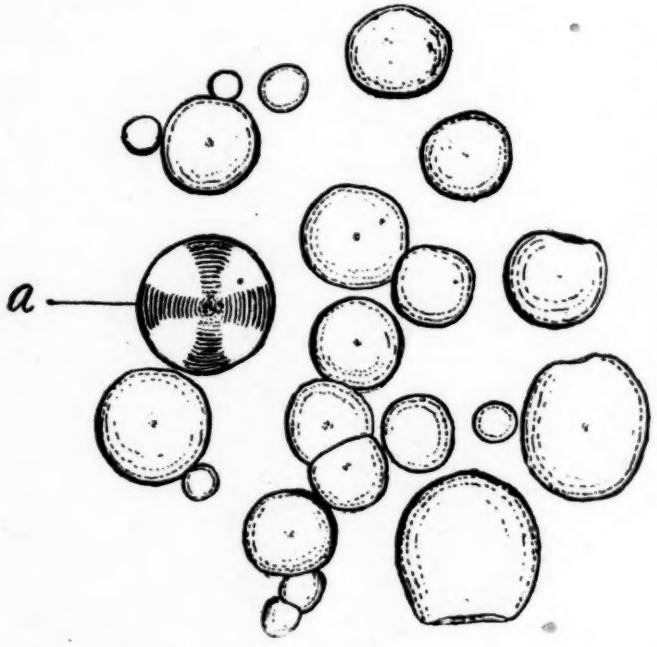

FIG. 5.

Sections treated for twenty-four hours or more with strong glycerin showed deposits in the secretion cells of stellate masses of yellowish-brown crystals, with a decided diminution of the intensity of color in the liquid contents of the cells. The crystals polarize beautifully, but for lack of time their chemical nature has not been investigated.

A number of drawings were made in the course of the study, illustrating further the structure of the rhizome and root. These drawings, together with one from the author's *Laboratory Exercises*,

giving a view of the plant and illustrating its floral structure, are reproduced herewith.

DESCRIPTION OF FIGURES.

Fig. 1.—*A*, Entire plant of Sanguinaria Canadensis in its flowering stage. *a*, rhizome and rootlets; *b*, one of the outer bud-scales: *c*, young leaf; *d*, flower complete, except that the caducous sepals have fallen away. ¾ natural size.

B, Different floral organs separated. *a*, a sepal; *b* and *c*, different petals; *d*, stamens; *e*, pistil in different views.

C, Ground plan of flower.

Fig. 2.—Part of cross-section of rhizome magnified 15 diameters. *a*, cork; *b*, vasal bundle; *c*, cluster of secretion-cells in middle bark; *d*, cambium; *e*, secretion-cells in pith.

Fig. 3.—Small portion of longitudinal section through xylem of a bundle, showing the reticulate ducts composed of short, irregular cells. *a*, parenchyma cell containing starch; *b*, one of the cells of a duct; *c*, aperture communicating with next cell of the series, forming a duct. Magnification 330 diameters.

Fig. 4.—Portion of the cross-section of a young root of Sanguinaria, showing the central radial bundle before any important secondary changes have occurred. The root-bundles are usually triarch or tetrarch, but in older roots the number of rays is much obscured by secondary formations so that the number of rays is difficult to determine. *a*, a secretion-cell; *b*, cell of endodermis; *c*, small duct at end of xylem-ray; *d*, pericambium layer, the cells of which contain much fine-grained starch; *e* phloem mass, in which occur some secretion-cells. Magnification, about 112 diameters.

Fig. 5.—Starch of Sanguinaria magnified 1,200 diameters. The grains are spherical or spheroidal, mostly simple, sometimes double; hilum central and usually inconspicuous and unfissured; grains smooth and with no obvious stratification lines; polarization cross faint, equal-armed.

ABIES BALSAMEA, MILLER.

By Carl G. Hunkel.

Twigs containing fresh leaves and few cones from this tree were collected by Mr. Cheney,[1] in Buffalo County, of this State, in the month of July, 1893. They were distilled in this laboratory, immediately upon their arrival. The specific gravity and rotatory power of the oil were determined by Mr. Urban, in the beginning of October of the same year. In April of this year, 1894, the physical constants of the oil were again determined. The specific gravity and

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[1] Instructor in Botany, University of Wisconsin.

rotatory power were determined at 20° C., the latter in a 100-millimetre tube.

	Urban.	H.
a	— 28·9166°	— 29·0375°
d	0·8881	0·8892
(*a*) *d*	— 32·55°	— 32·66°

It will be seen from these data that practically no change had taken place within six months.

Upon analysis the oil yielded the following results:

I. 0·2105 g. yielded 0·6496 gram CO_2 = 0·1778 g. C., and
0·2209 " H_2O = 0·02454 g. H.
II. 0·2297 g. yielded 0·7066 " CO_2 = 0·1927 g. C., and
0·2426 " H_2O = 0·02695 g. H.

	Found.	
	I.	II.
C	84·16 per cent.	83·895 per cent.
H	11·66 "	11·735 "

It will be seen from the results that the oil contains a large amount of an oxygenated compound. Upon distillation, the following fractions were obtained:

Fraction.	Yield.
— 160° C.	1·5 per cent.
161° to 165° C.	15·4 "
165° " 167° C.	17·7 "
167° " 170° C.	14·6 "
170° " 175° C.	21·5 "
175° " 185° C.	7·7 "
185° " 195° C.	5·4 "
195° " 205° C.	4·6 "
205° " 210° C.	6·2 "
above 210° C.	5·4 "

The unstability of the boiling point, as well as the acid reaction of the first fractions, seemed to indicate that the distillation was accompanied by a decomposition of an ester. Previous to saponification, the fractions were placed in a freezing mixture over night without any separation. The fractions were then mixed and 57 cubic centimetres of the oil boiled with potassium hydrate, dissolved in alcohol, for four hours. The amount of potassium hydrate consumed was then determined by decinormal sulphuric acid. It was thus ascertained that 2·5562 grams of potassium hydrate had been consumed in the saponification, corresponding to 8·9467 grams, or 17·65 per cent. bornyl or terpinyl acetate.

The alkaline liquid was distilled with water vapor. Oil came over clear at first, but toward the close of the operation the distillate crystallized. The crystals were carefully separated and dried on a porous plate. Melting point, 198°–199° C, in a sealed tube.

The oil was dried with exsiccated sodium sulphate. It was colorless, of a terebinthinate odor, specific gravity 0·8759 at 20° C. In a 100-millimetre tube, it deviated the ray of polarized light 26.47° to the left, hence $(a)_D = -30{\cdot}22°$. The oil was then fractionated for a second time. Toward the close of the operation the oil congealed in the condensing tube, and shortly after removing the flame, the contents of the flask crystallized.

FRACTION 160°–165° C.

A colorless oil, of a slight terebinthinate, but mixed odor, specific gravity at 20° C. = 0·8798. In a 100-millimetre tube it turned the plane of polarized light 27·15° to the left; hence $(a)_D = -30{\cdot}86°$. Upon analysis it yielded the following results:

I. 0·2085 gram yielded 0·6280 g. CO_2 = 0·1713 g. C., and 0·2135 g. H_2O = 0·0237 g. H.

II. 0·1873 gram yielded 0·5667 g. CO_2 = 0·1546 g. C., and 0·1942 g. H_2O = 0·02158 g. H.

Calculated for $C_{10}H_{16}$	Found	
	I.	II.
C . . . . 88·23 per cent.	82·15 per cent.	82·52 per cent.
H . . . . 11·77 "	11·38 "	11·52 "
100·00	93·53	94·04

PINENE NITROSO-CHLORIDE.

Since the odor of the fraction reminded one of pinene, the nitroso-chloride reaction was made. Five cubic centimetres of oil were mixed with 5 cubic centimetres of glacial acetic acid and 6 cubic centimetres of ethyl nitrite, and placed in a freezing mixture. To this was added, drop by drop, a mixture of 3 cubic centimetres of glacial acetic acid and 3 cubic centimetres of concentrated hydrochloric acid, and then 5 cubic centimetres of methyl alcohol. The yield of nitroso-chloride was very small, the crystals melting at 101° C. The mother liquid of the nitroso-chloride was then placed in a freezing mixture. Nothing separated after two hours. After twenty-four hours the mother liquid had become brown and crystals

had separated. These were filtered off and the mother liquid set aside again. In all, three crops of crystals were obtained. Their respective melting points were 134½°, 135° to 136°, 136½° to 137½°. The combined products were so small that nothing more could be done with the same.

FRACTION 165°–168° C.

A colorless oil of a more distinctly terebinthinate odor than fraction 160°–165° C.; specific gravity 0·8719 at 20° C. In a 100-millimetre tube it deviated the ray of polarized light 27·55° to the left, hence $(a)_D = -31·58°$.

BORNEOL.

The crystals which had congealed in the condensing tube during fractional distillation, when dried on a porous plate, were found to have a melting-point of 201°–202° C. Upon exposing the various fractions to the temperature of a freezing mixture, fractions 168°–172° C. and 172°–185° C. yielded more of the borneol. This was collected and crystallized from petroleum ether. The crystals consisted of large shining plates having the characteristic appearance and odor of borneol.[1]

ACETIC ACID.

The acid which, by the saponification of the oil, had been converted into a potassium salt was set free by sulphuric acid and distilled off with water vapor. The distillate was neutralized with sodium carbonate, evaporated to dryness, the residue repeatedly extracted with hot absolute alcohol and the hot solution filtered. The filtrate was set aside to crystallize. The crystals were dissolved in a small quantity of water and silver nitrate added. The silver salt, which crystallized in needle-shaped crystals, was drained, washed and dried.

0·19 gram of the salt yielded 0·1215 gram silver.

Calculated for $C_2H_3O_2Ag$.	Found
64·65 per cent.	63·95 per cent.

With considerable degree of certainty it may be said that lævogyrate pinene and lævogyrate bornyl acetate are present in this oil. Bertram and Wahlbaum[2] attribute the odor of firs to the presence

[1] *Liebig's Annalen*, Vol. 230, p. 226.
[2] *Archiv d. Pharm.*, Vol. 231, p. 290.

of bornyl acetate, which, according to their statement, is present in almost all of them. As soon as more material can be obtained the investigation will be continued, since the substance that crystallized from the mother liquid of the pinene nitroso -chloride deserves further attention.

PHARMACEUTICAL LABORATORY, UNIVERSITY OF WISCONSIN.

DILUTED HYDROBROMIC ACID.

BY CHAS. H. LAWALL, PH.G.

Diluted hydrobromic acid is one of the articles of the Pharmacopœia for which there is no official process of manufacture, although the Pharmacopœia fixes the standard of purity in a similar manner to the other acids. Notwithstanding the fact that diluted hydrobromic acid is not an article of everyday occurrence in prescriptions, this standard of purity should be as rigorously upheld as that of the more frequently occurring acids.

Some time ago the writer of this article had occasion to examine a sample of diluted hydrobromic acid, which was known to have been made by Fothergill's process. The results of the examination were so widely at variance with the requirements of the Pharmacopœia that other samples were procured from various sources in order to ascertain the purity of the article as commonly found in the market.

Six samples have been carefully examined, all but one of which were from wholesale and manufacturing houses in Philadelphia. Not one of the samples tested complied with all of the requirements of the Pharmacopœia, and while one or two approximated a state of purity, the remaining specimens were very impure, and showed evidence of very careless or faulty methods of manufacture. Free sulphuric acid was present in several of the samples (Nos. 3 and 6), an inexcusable contamination, and all of them indicated a higher percentage of absolute hydrobromic acid than is allowed by the Pharmacopœia.

The tabulated statement of the behavior of the samples with the official tests is as follows:

	Specific Gravity.	Miscibility with alcohol.	Residue left after evaporation.	Precipitate with barium chloride (Sulphates).	Per Cent. of absolute HBr. by titration.	Remarks.
No. 1 . . .	1·090	ppt.	7·14 p. c.	turbid	11·42	Made by Fothergill's process.
No. 2 . . .	1·077	clear	none	ppt.	10·60	
No. 3 . . .	1·106	clear	slight	ppt.	14·04	Contained free H_2SO_4.
No. 4 . . .	1·087	clear	1 p. c.	none	11·50	
No. 5 . . .	1·077	clear	none	ppt.	10·50	
No. 6 . . .	1·080	clear	slight	ppt.	12·72	Contained free H_2SO_4.

The presence of sulphates in all of the samples examined, excepting the fourth, would indicate that impure potassium bromide had been used in their manufacture, or that the acids had been made by Hager's process (Nat. Disp., page 58) and an excess of sulphuric acid used. The former view is more likely to be correct in the cases of samples 2 and 5, as they contained no free sulphuric acid. In the August number of the AMERICAN JOURNAL OF PHARMACY for 1894, an article is published entitled "Potassium Iodide and Bromide of the Market—Do They Come up to the Requirements of the Pharmacopœia?" and it is a significant fact that only three of the eight samples of potassium bromide that were examined were entirely free from sulphates.

305 CHERRY STREET, PHILADELPHIA.

A REVIEW OF GAULTHERIN, THE GLUCOSIDE FROM BETULA LENTA, L.

BY FRANK X. MOERK. PH.G.

At the Pharmaceutical meeting held in the Philadelphia College of Pharmacy, December 4, 1843, a paper was read by William Procter, Jr., entitled "Observations on the Volatile Oil of Betula Lenta, and on Gaultherin, a Substance Which, by Its Decomposition, Yields That Oil." The important points of that paper may be

briefly reviewed as follows, using, as far as possible, the exact words of the writer: (1) as establishing the identity of volatile oil of *Betula lenta* with the oil of gaultheria, which had shortly before been proved to be methyl salicylate by M. Cahours; (2) establishing the existence of a peculiar principle in the bark of *Betula lenta*, which bears the same kind of relation to the oil of gaultheria or *Betula lenta* that amygdalin bears to the oil of bitter almond, and which was called *gaultherin*, as it gave rise to the oil of gaultheria by its decomposition; the term *betulin* was admitted to be more appropriate, but had already been applied to another substance; (3) the existence in the bark of *Betula lenta*, associated with gaultherin, of a substance enjoying the property of reacting with the latter so as to produce the volatile oil, and which is analogous in its mode of operation to synaptase or emulsin. The constituents of the bark of *Betula lenta* were given as tannin, gum, saccharine matter, resin in considerable quantity, *gaultherin*, fixed oil *soluble in alcohol, etc.* The dry bark does not possess the odor peculiar to the volatile oil, but the latter is only developed by contact with water, recalling the analogous behavior of wild cherry bark. The powdered bark, exhausted by maceration and displacement with cold 95 per cent. alcohol, no longer gives the odor of the oil when moistened with water; the alcoholic solution, evaporated to an extract and mixed with a part of the exhausted bark and water, immediately developed the odor, and by distillation yielded a liquid which gave all of the tests for the oil of *Betula lenta.*

The leaves of *Gaultheria procumbens*, after drying, did not yield the same principle; the leaves, when long kept, lose their odor, and mixture with water does not revive it as with *Betula lenta;* hence, it would seem that the methyl salicylate is an immediate product in the *Gaultheria procumbens*, whilst in the *Betula lenta* it is secondary. To purify this principle, gaultherin, the alcoholic extract of the bark is treated with water, which leaves the resin and fixed oil; the dark red liquid so obtained, containing tannin, extractive and saccharine matter, is then treated with an excess of lead hydrate until these substances are separated and the transparent, nearly colorless liquid obtained by filtration is carefully evaporated. A transparent, gummy mass results, which almost wholly dissolves in 97 per cent. alcohol; the alcoholic solution by spontaneous evaporation yields a syrupy, almost colorless product, which does not crystallize after standing

several weeks. *In this state it is evidently associated with some substance that prevents its crystallization.* The syrupy liquid was agitated with several times its bulk of ether, but the former separated from the mixture unchanged. The difficulty of combining gaultherin with other bodies opposes a barrier to its examination.

As thus obtained, gaultherin has little if any odor and a slightly bitter taste; heated carefully on a glass plate until all the moisture has evaporated, it remains as an easily pulverizable, varnish-like layer, which may be heated to 300° F. without change; at 400° F. it is decomposed, oil of gaultheria being among the products. Distillation with diluted hydrochloric and sulphuric acids gave rise to the volatile oil; diluted nitric acid gave minute yellow crystals, similar to those obtainable from the oil.

The fixed alkalies and alkaline hydrates wholly destroy the power of generating the volatile oil, and convert gaultherin into an acid (gaultheric acid), which remains combined with the base. Ammonia has but slight action upon gaultherin, as, after boiling, it still is capable of producing the volatile oil by reaction with the residue of the bark.

Gaultherin boiled with lead hydrate and water is but slightly decomposed, yielding a filtrate having an alkaline reaction and containing lead; by the cautious addition of sulphuric acid and filtering off the lead sulphate, there is obtained an acid solution which contains no sulphuric acid.

Gaultherin in aqueous solution, made alkaline with ammonia, is precipitated by lead subacetate, but appears to be converted into gaultheric acid or otherwise decomposed, as neither the liquid filtered from the precipitate nor that obtained by decomposing the precipitate with dilute sulphuric acid would yield the volatile oil when mixed with the residue of the bark. *Gaultheric acid* is obtained by dissolving gaultherin in baryta water, boiling the solution for a short time, and afterward passing a current of carbonic acid gas through the liquid until all free baryta is removed, and then filtering. A neutral solution of gaultherate of barium is obtained, from which the free acid may be isolated by the cautious addition of dilute sulphuric acid, as long as a precipitate is produced. The filtered liquid is strongly acid and does not precipitate baryta water; by evaporation it dries into a gum-like mass. In this form it is impure. By boiling it with lead carbonate until saturated, filtering

and precipitating the lead with hydrogen sulphide, a solution is obtained containing the acid in a much purer state, which, by evaporation, yields it in a nearly colorless mass with some evidence of crystallization. Gaultheric acid is soluble in water and alcohol, but is only slightly taken up by ether. It saturates bases, forming neutral salts which do not crystallize. By distilling it with dilute sulphuric acid, oil of gaultheria is obtained, and nitric acid appears to act on it like gaultherin.

The substance existing in the residue of the bark, after exhaustion by alcohol, and which reacts with gaultherin to produce the volatile oil, has not been isolated. It is insoluble in water, as by long maceration in that fluid it is not removed or changed. The temperature of ebullition, as well as maceration in solution of potassa sp. gr. 1.05, destroys its power of acting upon gaultherin. The impossibility of finding a menstruum capable of dissolving this principle, has prevented a further examination of its properties.

It will be interesting to know the ultimate composition of this principle and the relation it bears to gaultheric acid and methyl salicylate; before that can be accomplished, the necessity of obtaining it in a pure state is imperative. It is hoped that the attention of chemists will be attracted to these principles, and their character more fully developed.

Just about fifty years have elapsed since the publication of the above experiments without any further investigation being recorded. In *Archiv der Pharmacie*, 1894, page 437, there is to be found the second publication bearing upon this subject, by Dr. A. Schneegans and J. E. Gerock. These writers have taken as their field of labor the separation and properties of glucosides which, by their decomposition, yield volatile oils. Their first paper bearing upon the volatile oil of *Spiraea ulmaria* was published about two years ago. The results of this investigation, while not as successful as anticipated, disclosed that several glucosides were present, which, by their decomposition, yielded salicyl-aldehyde, as well as methyl salicylate, but the quantities of these glucosides which are present was very small, so that their preparation in a state of purity was not successful.

Turning their attention next to the glucoside yielding methyl salicylate which appeared to offer more promising results, the bark

of Betula lenta was taken for investigation. Preliminary experiments established the absence of preformed volatile oil; the 94 per cent. alcoholic tincture, always possessing the odor of wintergreen, indicated the unexpected decomposition of the glucoside in strong alcoholic solution; to prevent this decomposition the bark was extracted with lead acetate (15 per cent. of the weight of the bark) in strong alcoholic solution, whereby the ferment is rendered inactive. Such a tincture possesses no odor of wintergreen. After precipitating the lead with hydrogen sulphide, the liquid is concentrated by distilling off the alcohol; the brown syrupy residue is taken up in absolute alcohol, filtered from the insoluble substances, and the filtrate mixed with several volumes of ether, when a voluminous white precipitate is produced, which agglutinates to a yellow, plastic mass. This, redissolved in alcohol and allowed to evaporate spontaneously, forms a thick liquid, in which are slowly formed star-shaped groups of short, prismatic crystals. The crystals, separated by suction from the mother-liquor (this by exposure for several months to low temperature did not separate any additional crystals; it consisted almost entirely of a reducing sugar, and contained but traces of gaultherin, as distillation with dilute acids failed to give appreciable quantities of the oil), and recrystallized several times from alcohol after digesting with animal charcoal, were obtained as colorless, crystalline needles. The name gaultherin is retained for the same reasons given by Procter.

Gaultherin is quite, although in the crystallized condition only slowly, soluble in water; also soluble in alcohol and concentrated acetic acid without decomposition; ether, chloroform, aceton, benzol, do not dissolve it. Concentrated sulphuric acid dissolves it, with a pale rosé color, changing quickly to brown and black. It does not melt without decomposition; a little above 100° C. the odor of gaultheria becomes perceptible, and at 120° C. it commences to become brown. The freshly prepared aqueous solution is not colored by ferric salts even after boiling. Fehling's solution is not reduced in the cold, but quickly upon boiling. Heated with small quantities of mineral acids, the odor of wintergreen is recognizable, and the fluid becomes milky, and, if sufficiently concentrated, deposits heavy, oily drops; the solution then quickly reduces Fehling's solution.

Gaultherin, in aqueous solution, is lævogyre; it possesses a purely

bitter taste, therefore is not decomposed by the ferments of the saliva; it is not decomposed by emulsin or diastase. Decomposed by dilute mineral acids, it yields only two products, *sugar* and *methyl salicylate.* Moist gaultherin is slowly decomposed, as is shown by the faint odor of wintergreen which such specimens show after a few days; the aqueous solution, heated in a closed tube to 130°–140° C., gives the above-mentioned two decomposition products.

The glucoside crystallizes with a molecule of water, which is only in part given off if kept over sulphuric acid or dried at ordinary temperature or with moderate heating; drying at a somewhat higher temperature brings about its decomposition, so that combustions made with the crystals dried under different conditions show a variation of as much as 2 per cent. in the amount of carbon. After ascertaining the cause of these variable figures, two combustions were made, giving the following composition:

	I.	II.	Calculated for $C_{14}H_{18}O_8 + H_2O$
C	50·31	50·28	50·60
H	5·99	6·22	6·02

Procter's preparation in all probability consisted chiefly of sugar; the formation of gaultheric acid (which see in the previous part), by boiling with baryta water, as stated by Procter, was repeated with the crystallized gaultherin, but with very different results. Baryta water, in the cold, will decompose gaultherin after a short time; heated to the boiling point the glucoside is decomposed with the saponification of the methyl salicylate so that the solution contains methyl alcohol, barium salicylate and sugar; what was called gaultheric acid, therefore, is a mixture of sugar and salicylic acid, and all of the properties ascribed by Procter to this acid are due this mixture, save one, which is not explainable, namely, the formation of oil of wintergreen by distilling the so-called gaultheric acid with dilute sulphuric acid. If the proof of this consisted in testing the distillate with a ferric salt, instead of actually observing the oil, even this is explainable, as salicylic acid will volatilize with the steam.

Without attempting the isolation of the ferment, which brings about the decomposition of the gaultherin, the statement of Procter, that the ferment is insoluble in water, is discredited, on the ground

that moistening the powdered bark develops almost instantly the odor of wintergreen. Attention is called to the development of the wintergreen odor in the alcoholic tinctures, and that the indicated decomposition of the gaultherin continues during the evaporation of the solutions. A complete decomposition of the glucoside during the evaporation was, however, never observed. To prevent this decomposition various experiments were made to render the ferment inactive; drying the powder at 110° C. for some hours, and the employment of mercuric chloride solution, were without effect; adding the powdered bark to boiling water somewhat interfered with the ferment, as decidedly smaller yields of volatile oil were then noticed; the use of lead acetate proved to be the simplest and most reliable method of preventing the decomposition of gaultherin by the ferment. (This, possibly, is then the explanation of the remarkable behavior of gaultherin noticed by Procter when he added lead sub-acetate to an ammoniacal solution of gaultherin and tried the effect of the original filtrate and of the filtrate resulting from the decomposition of the precipitate with dilute sulphuric acid upon some of the exhausted bark without getting the odor of wintergreen from either solution.)[1]

An extended chemical investigation of gaultherin was intended, but was frustrated by the disappointingly small yield of gaultherin from a second lot of bark imported especially for this work; the cause of this small yield cannot be positively stated, as it may be due to the time of collecting the bark or to a decomposition of the greater portion of the glucoside by some unknown cause.

FLESH IN PHARMACY.

By William B. Thompson.

Gland extract, and its utility as a therapeutic agent, is just now a debatable subject in medical circles. When experiment, observation, and experience establish something definite, and this is favorable, the pharmacist may prepare for an era in animal products. We do however have some connecting links with this series of actual body parts as internal remedies—in musk, castor and fel bovis—to which might be added cod liver oil; but a revival such as is discussed would almost seem like a return to the cauldron

[1] See pievious part of this paper.

contents of Macbeth's weird witches' stew! and, seriously, the idea of the substance of a gland from an animal in health being used to effect a cure of a disease supposed to be due to the interrupted function of a similar gland in another body, has something about it of the *similia similibus* certainly. Animal physiology (human) divides the glands into two groups—the secreting, or those having ducts, and the non-secreting, orductless. The secreting glands all have outlets to the surface of the body. These diversified secretions can be collected and an analysis determine their character; but how is it with the ductless glands? These are none the less component parts of the physical structure, and perform certain wise and benign functions in the human economy. They do give to the body sustenance and support in some appreciable way, but not in a manner of which we have exact knowledge. In this they differ essentially from the former class of glands. An analysis of their substance gives only the usual flesh constituents. We can discover in them no special or unusual element. How then can we intelligently apply and use them? Such application would seem to be quite similar to taking the "hair of the dog that bit you" to heal the bite The attention which this subject has already elicited will arouse a yet stronger interest, and the evidence of "things seen" will be eagerly sought; then, possibly, the pharmacist may place side by side with his jars, "ungenta," a flesh-pot or two labelled "Extractum carnis humanæ," or "animalis"!

One merit, however, there will be in the gland treatment for the apothecary, and it is this, that, to maintain repair, the remedy must be maintained, and the original prescription will be necessarily renewed *ad infinitum*.

THE FLORIDA SPONGE INDUSTRY.

By William B. Burk.

Sponge is a substance with which almost everyone is familiar, as there are but few living in civilized communities who do not find occasion to use it for a great variety of purposes. The article is so very useful that a large number of inconveniences would arise if it could not be obtained. Without it, what would the surgeon, the traveller or the housekeeper do? And yet, most of those who use sponges in an infinite variety of ways all their lives, never stop to

consider how they are formed; that is, whether they are plants or animals, or what their history or habits may have been.

Sponges consist of a framework or skeleton, coated with gelatinous matter and forming a non-irritable mass, which is connected internally with canals of various sizes. The ova are very numerous, and present in appearance the form of irregular shaped granules derived from the gelatinous matter which grow into ciliated germs, and, falling at maturity into small canals, are then expelled through the orifices. When alive, the body is covered by a gelatinous film, which, being provided with cilia, causes a current of water to pass in at the smaller pores and out at the larger apertures, the sponge probably assimilating the nutritive principles contained in the water.

Sponges are found abundantly in tropical waters, generally. They gradually decrease in numbers towards the colder latitudes, till they become entirely extinct. They vary much in shape. Some are shaped like a vase, others are semi-cylindrical, others flat like an open fan, and some are round.

The commerce in sponges is of considerable importance. The great difficulty which is experienced in any attempt to distinguish species, results from the extreme susceptibility of all keratose sponges to any change in external conditions. They appear to require, for the production of the forms in abundance, tropical or sub-tropical seas, and attain by far their greatest development in the number of the forms and species in the Gulf of Mexico and West Indian seas. The typical forms, the commercial sponges, are essentially confined to the waters of the Bahaman Archipelago, and the southern and western coasts of Florida in the Western Hemisphere, and to the Mediterranean and Red Seas in the other.

The Florida sponge grounds form three separate and elongated stretches along the southern and western coasts of the State. The first includes nearly all of the Florida reefs, the second extends from Anclote Keys to Cedar Keys, and the third from just north of Cedar Keys to Saint Mark's. The Florida grounds have a linear extent of about 120 miles, beginning at Key Biscayne, in the northeast, and ending in the south at northwest channel, just west of Key West. The northwestern half of the grounds is very narrow, having an average width of only about five miles, and being limited to the outer side of the reefs. At about the Matacumbo Reefs the grounds

broaden out so as to cover the entire width of the reefs, which are much broader here than at the north. The entire southern half of the grounds has more or less of the same breadth, which is about 13 or 14 miles. The second sponging ground begins just south of Anclote Keys, with a breadth of 7 or 8 miles, which it maintains from a point opposite Bat Fort to Sea Horse Reef, just south of Cedar Keys. The total length of this sponging ground is about 60 geographical miles. Its distance from the shore varies somewhat. At the south the inner edge approaches within 4 or 5 miles of the main land, and comes close upon Anclote Keys; but throughout the remainder of its extent it is distant 6 to 8 miles from the shore until it touches the shallow bottom and reefs of Cedar Keys. The depth of water on these grounds, as indicated on the coast survey charts, ranges from 3 to 6 fathoms, but many portions are undoubtedly shallower than this. The northern ground, which maintains a nearly uniform width throughout, is about 70 miles long by about 15 miles broad. It approaches to within about 5 miles of the shore and terminates just off the mouth of Saint Mark's River; the depth of the water is the same as upon the next one to the south, *i. e.*, from 3 to 6 fathoms. The total area of the Florida sponging grounds, which are now being worked, including also those that were formerly fished upon but have since been more or less abandoned, may be roughly stated at about 3,000 square geographical miles. This probably does not include all of the sponging grounds occurring in Florida waters, for the fact that new areas are being constantly discovered would indicate that there might still be more to find, and it is certain that no strenuous efforts have yet been made to extend the grounds already known, the discovery of new ones having generally been made by accident.

The sponge fishery of the Florida coast differs from that of the Mediterranean, in that sponges are not obtained by divers, but by means of a long hook fastened to the end of a long pole, and managed from a small boat. In Florida, small vessels, of from 5 to 50 tons measurement, are employed to visit the grounds to afford quarters for the men, and to bring home the catch. These vessels are generally of light draught and schooner rigged, having proportionately large decks on which to carry boats, working gear and the sponges caught. The holds are of considerable size for storing the sponges, and the cabins generally small, indicating a sacrifice of comfort to

working room. Each vessel carries, according to its size, from five to fifteen men, one as cook and the remainder as fishermen, and also a small yawl boat to every two fishermen, to be used by them in securing the sponges. In addition to the working tools for taking sponges, they are provided with a sufficient quantity of provisions, wood and water for the trip, lasting from four to ten weeks.

The working outfit for a Florida sponging vessel consists of a few small yawl boats, called dingies, and a supply of sponge hooks and sponge glasses. The boats used are always made as light as possible. They are from 15 to 20 feet long, and from 4 to 6 feet wide. The idea is to have the boats light enough to enable two men to haul them in and out over the side of the vessel, and yet strong enough to withstand the rough handling, which they are sometimes subjected to, and to carry the heavy loads resulting from a day's catch. While catching sponges it is necessary to scull the small yawl boats (dingies) from the stern, and, for convenience in doing so, this form of sculling notch is used: A piece of oak plank, about 6 inches wide and 1 foot long, is notched at one end to fit the oar and inserted at the other between two guiding strips well fastened to the stern sheet. This sculling notch is placed at one side of the centre of the stern sheet, and is made to be easily removable in order that it may be taken out of the way when not needed. The sponge hooks are made of iron, with three curved prongs, measuring about 5 to 6 inches in width. The entire length of a hook is about 8 inches, the upper end being made into a very strong socket for the insertion of the pole.

The sponge glass is made from an ordinary wooden bucket, the wooden bottom being replaced by one of ordinary window glass, securely fastened by cement. In using a sponge glass it is placed upright on the surface of the water, the handle of the bucket is placed on the back of the neck of the fisherman with his head thrust down in the bucket. In this way the fisherman can distinctly see very small objects in very deep water, and he can easily distinguish good sponges from those of an inferior grade.

When the sponger discovers a suitable sponge, through the aid of the sponge glass, he hurriedly grasps his hook, and, plunging it directly upon the sponge, he skilfully pulls it from its habitation and brings it up to the surface and places it in the boat. As soon as the fisherman collects a sufficient quantity, he takes them to the

vessel, where they are spread carefully on the deck in their natural upright position, so as to allow the slimy matter, called "Gurry," by the sponger, to run off. During the first stages of decomposition they have a very unpleasant odor, something like decayed fishy matter. After the dingies collect sufficient sponges to make a vessel load, they are taken to what are called sponge crawls, which is an enclosure of about 10 to 12 feet, made generally by placing stakes in the beach where the water is from 2 to 3 feet deep.

Sponges, after being kept on the decks of the vessel from one to two days, will generally be sufficiently cured to be taken to the crawls, and then they are kept there for a few days and then thoroughly washed and pounded with a flat stick. They are then placed upon strings of about 6 feet in length and taken to the markets, where they are sold at auction. They are generally sold in lots, and then carefully trimmed and packed in bales weighing from 15 to 100 pounds each, according to quality, the cheaper grades being generally packed in the larger bales.

The principal varieties of sponges found in Florida are the following: Sheep-wool, yellow and grass. The Florida sheep-wool are the best quality, being of very fine texture, soft and very strong and durable. The yellow sponge is of fine quality, but not strong in texture, and not near as soft or durable as the sheep-wool sponges. The grass is very much inferior to the others, not being as strong nor so desirable in shape, and being easily torn.

There are no sponges found in the world to equal the Florida sheep-wool for softness and strength, and no better bath sponge can be found than a good, solid Florida sheep-wool, although they are generally sold for washing carriages, etc. In former years Florida sponges were loaded with lime or sand in order to decrease the price, but of late very few loaded sponges have been placed upon the market.

Sponges in great variety are also found in many places in the West India Islands, also in Cuba. The Cuban sponges are the next best to the Florida. The principal varieties found in Cuba or the West Indies are sheep-wool, reef, yellow and grass, also velvet, which are next best to the sheep-wool.

The finer grades of sponges are found principally in the Mediterranean, such as the fine surgeon's, toilet, bathing and nursery sponges, and they are very much higher in price than any others.

Florida produces nearly double the amount of sponges that are imported from all other countries; that is, in value, not quantity, and the demand for good Florida sponges is considerable greater than the supply. Consequently, the prices must advance from year to year. The prices have more than doubled, within the last twenty years, for Florida sponges.

The fine, soft species of sponges, such as surgeon's, toilet, nursery, bath, etc., are found in great variety in the Mediterranean, and are fished principally by divers, sometimes at great depth. After being brought to the land they are buried in the sand and allowed to decompose, after which they are well washed and beaten with a small stick, and then packed in bags and sent direct to London, and again thoroughly cleaned and packed in cases according to size and quality. The large London dealers have almost complete control of the sponges found in the Mediterranean. There are a great many varieties found there, principally the fine surgeon's, toilet, bathing, potter's, fine thin flat, (called elephant's ears by the native fishermen), fine cups, Zimocca toilet, Zimocca potter's, etc. Some of the finest cup sponges are sold at as high as $100 per dozen. The Mandruka bath sponges are also very expensive and very rare. Some of the cheaper species are also found in the same waters, but none like those found in Florida or Cuban waters.

LABORATORY NOTES.

By Lyman F. Kebler.

PURE DELAWARE HONEY.

It is considered by some that a standard for pure honey is not hard to fix, while others consider the task somewhat more difficult. Theodore Weigle[1] in his report, at the tenth annual meeting of the Independent Association of Bavarian Representatives of Applied Chemistry, stated that there had come to the public notice an artificial honey which so closely approximated the genuine product, both physically and chemically, that it was impossible to distinguish it from the real article. Nor is this an isolated case, but is amply supplemented by every tabulated examination of honey, conspicuous among which are the honeys reported in Bulletin Agr. Dept.,

[1] Deutsche Zuckerindustrie 16, 1043.

Wash., D. C., No. 13, part 6, where we frequently find such appellations as "apparently adulterated," "apparently genuine."

In deciding whether a honey is a natural product or not, we must call into question every recognized qualification a pure honey should possess, and then we are occasionally unable to make an absolute decision.

Pure honey is the nectar of flowers and other saccharin exudations of plants, collected by bees and stored in cells built, in part at least, by the bees themselves. The source from whence the honey is collected is of no small importance.

Honey may vary in color from a water white to a black, is generally levorotatory, rarely exceeding—20° at 20° C. Contains from 12–20 per cent. of water, from a mere trace to 0·30 per cent. of ash, from 60–75 per cent. of reducing sugar, from 0–10 per cent. of sucrose, and a microscopical examination should reveal the presence of pollen grains. The U. S. P. requires a limit of chlorides and sulphates.

Recently there came to my notice a number of samples of honey containing an excess of chlorides. From this it was concluded that the honey had been adulterated with glucose prepared through the agency of hydrochloric acid. During a conversation with the producer I learned that the honey had been accumulated from a "salt marsh." Thinking that this environment might account for the excessive quantity of chlorides, I made a complete examination with the following results: color light yellow, all were levorotatory (—1·85° to—2·82°) at the normal temperature; average percentage of water 16·13 per cent.; ash 0·25 per cent.; reducing sugar 68·19 per cent.; an abundance of pollen grains; sulphates, a trace; chlorides excessive; and the honey would not comply with the absolute alcohol test which, in my opinion, is an excessive requirement. I have not found a single honey in over one hundred samples that would comply with this test rigidly. Dextrin is the principal ingredient this test endeavors to eliminate. G. L. Spencer[1] has shown that pure honey may contain as much as 4 per cent. of dextrin, and E. von Raumer[2] has demonstrated that honey dew contains a large percentage of dextrin which frequently finds its way into honey during certain portions of the year.

[1] 1892, Bull. Agr. Dept., Wash., D. C., No. 13, 808.

[2] 1894, Ztsehr. anal Chem., 33, 397.

From these data I was convinced that the above samples represented natural products.

PYROGALLIC ACID.

Three well-known brands of pyrogallic acid gave me the following melting-points: A, 116—118° C.; B, 116° C.; C, 117° C. After applying the ferric chloride, ferric acetate, lime water and pine wood moistened with hydrochloric acid tests I was unable to make a definite decision as regards the purity of the products. Recent authorities inform us that pyrogallic acid melts at 131° C., while catechol melts at 111°C. Judging from the melting points it is quite probable that the samples were mixtures of pyrogallic acid and catechol.

LIGHT OIL OF WINE.

It seems almost inconceivable to what depths the finite mind will stoop deliberately to defraud his fellow man for a little pecuniary gain. I was forcibly convinced of this while examining a number of samples of light oil of wine. The price varied from 80 cents to $4.50. The following table contains the results of the examination:

Sample.	Sp. Gr. at 15° C.	B. P.	Reaction.	Color.	Odor.
1	0·819	90–135	Neutral	Yellowish	Fusel Oil
2	0·850	70–141	Acid	Colorless	Ethereal
3	0·828	50–154	Neutral	Yellowish	Ethereal
4	0·864	76–135	Acid	Colorless	Ethereal

Number *one* was unadulterated fusel oil. Numbers *two* and *four* were mixtures of ether, alcohol and small quantities of heavy oil of wine. Number three was, approximately, a mixture of equal parts of commercial ether and heavy oil of wine.

OIL OF SASSAFRAS.

Oil of sassafras begins to boil[1] at 115°[2] and gradually rises to 235° C. Specific gravity from 1·070 to 1·080° at 15° C. Equal parts of the oil and nitric acid produce a violent reaction with a red

[1] Ladenburg's Handwörterbuch der Chemie, **8**, 320.

[2] Probably a little low.

color; the oil is finally converted into a resin. The table below contains the results on ten samples of oil:

Sample.	Sp. Gr. at 15° C.	B. P.	Color.	Reaction.	Nitric Acid Test.
1	1·0680	210–234	Colorless	Neutral	Normal.
2	1·1006	230–236	"	"	"
3	1·060	190–236	"	"	"
4	1·053	195–231	"	"	"
5	1·077	200–233	"	"	"
6	1·053	176–232	"	"	"
7	1·050	192–234	"	"	"
8	1·054	179–231	"	"	"
9	1·076	180–232	"	"	"
10	1·075	215–233	Yellowish	"	"

Numbers *one*, *five*, *nine* and *ten* approximately comply with the U. S. P. requirements, number *two* is commercial safrol and of the remaining five, probably all but number *two*, are the so-called pseudo-sassafras oil, or "artificial sassafras oil," produced by fractionating camphor oil.

IPECAC ROOT.

The following observation is worth a passing notice in that it scores a point for assaying with volumetric acid solutions. Two samples of ipecac root were assayed according to Mr. C. C. Keller's process. The thick annulated root, generally called "Fancy Root," yielded by the gravimetric process 1·67 per cent., by titration with volumetric acid solution 1·62 per cent. of alkaloid. The "Wiry Root" by the gravimetric process gave 2·39 per cent., by titration with volumetric acid solution 2·33 per cent. of alkaloid.

One hundred and two pounds of the "Wiry Root" were percolated. Before the fluid extract could be completed, it was necessary to utilize a portion of it. Accordingly, the product was assayed and the desired quantity was removed. This assay yielded 2·18 per cent. of alkaloid, a loss of 0·15 per cent., or 14 94 gallons when the product is finished. We were again compelled to remove a portion of the fluid extract before it was finished; this was done by another assay. When the product was finished it was standardized. On adding the two portions previously removed to the finished product we obtained 15·25 gallons against 14·94 gallons obtained by the first assay, a difference of 0·31 gallon.

Several conclusions can be deduced from the above:

(1) Titration with volumetric acid solutions gives most encouraging results.

(2) That the "Fancy Root" is frequently not as valuable as the "Wiry Root."

305 CHERRY STREET,
PHILADELPHIA, PA.

CORRESPONDENCE.

TO THE EDITOR OF AMERICAN JOURNAL OF PHARMACY.

SIR:—The writer has been ever impressed with the work and good intentions of the membership of the "Alma Mater," they always being for the best interests of pharmacy.

Yet, when at a recent meeting of the Philadelphia College of Pharmacy, the action taken by the American Pharmaceutical Association at the Asheville meeting, as far as it related to Tax-free Alcohol, was denounced as being prejudicial to American pharmacy, and requesting the trade of this country to join with them in an appeal to the Government, for granting free alcohol under the present tariff bill, without pointing out to members of the profession the real and lurking dangers connected with this concession of Tax-free Alcohol, is a great surprise to the writer.

Being one of those who advised the course taken by the American Pharmaceutical Association, and on reading the "circular letter" on Tax-free Alcohol issued by the committee of the College, I am impressed with the fact that there is a noptimistic and pessimistic view in the controversy.

The writer wishes to say that he is opposed to *any* tax being levied on anything produced or manufactured *in this country*, and as it is necessary to raise revenue for the carrying on and maintainance of the Government, that the same be either raised by direct taxation of every individual, or by imposing sufficient tariff upon goods that are imported into this country. Therefore I am for *free alcohol for all.* I am, however, opposed to class legislation, and for this reason I do not favor free alcohol in the arts or medicine. Class legislation is one of the great curses of the land, and it is productive of law-breakers, and consequently crime and criminals go rampant. I will not go further into the moral side of the question, but will adhere to the economic issue.

Is it good business policy for the retail druggists of this country to ask for Tax-free Alcohol? In case the Government accedes to the request and allows the withdrawal and use of alcohol in the manufacture of medicine, the law provides that it be done under regulation and supervision of the Secretary of the Treasury and the Collector of Internal Revenue. Who will defray the expense of this supervision? Certainly not the Government, who, in granting a franchise, will not draw upon its treasury for the expense of its distribution. While the manufacturing pharmacist, who uses barrels of alcohol to that of the dispensing pharmacist's gallons, will cheerfully and willingly bear this expense, it will be out of the question for the retailer to do the same on account of a personal government supervision, which undoubtedly will be required.

Cannot we learn a lesson from the past? We petitioned Congress for the removal of the "stamp tax" from proprietary medicines; being promised by the manufacturers, that the retailer would receive the benefit in the less cost of goods. It was done, the tax was removed, and when we asked for the promised rebate, we were told that the money was being expended for advertising, and the retailer would thus be benefited. Then we took up the subject of having laws passed in the several states for the regulation of the practice of pharmacy. The laws have been in existence for a number of years, and I ask in all candor, who has been the beneficiary?

Therefore, my advice is to the retailer, ask for no tax-free alcohol; if the Government grants it under favorable regulations to us, all right; if otherwise, we will protest in having legislation that is injurious to our trade and profession, and not be placed in the position of being told you petitioned for it and you got it, as in the fable of the frogs.

ALBERT E. EBERT.

CHICAGO, December 16, 1894.

To the Editor of AMERICAN JOURNAL OF PHARMACY.

SIR:—With pleasure I noticed that the question about the presence of an *active principle in Cereus grandiflorus*, has been taken up in England. I would like to call your attention to an article in the *Pharm. J. and Transactions* for Nov. 24, 1894, p. 416, by Gordon Sharp.

"*A preliminary analysis of Cactus grandiflorus*," in which the author decides "glucosides and alkaloids are absent" in the plant.

This disposition of a mooted question is effective. Over three years ago I was engaged in a similar investigation. I beg leave to refer you to a *Note on Cactus*, written in August, 1891.[1] A certain Dr. O. D. Deyer stated that he had isolated the active principle of *Cereus grandiflorus*, and employed it in constant and definite quantities, (*New York Medical Journal*, for June 13, 1891). It is not uncommon that substances are found by amateur chemists which do not exist; that could not have been found if their method of investigation was correct, or substances that are of an entirely different nature from the supposed and claimed one. Impurity of reagents, ignorance of the operators, lack of a good scientific foundation, often come together in those discoveries.

To general methods of plant analysis, fluid extract of *Cereus grandiflorus did not yield to me an alkaloid.* These methods included "characteristics for many glucosides," I worked in 1891 on plants obtained here.

Yours truly,

J. B. NAGELVOORT.

DETROIT, December 10, 1894.

THE KOLA NUT.

The following information concerning this drug has just appeared in Consular Report, Vol. 46, No. 171, page 532.

The Department on August 18, 1894, instructed the consuls at Bathurst, Gorée-Dakar, Monrovia, Mozambique, Sierra Leone, Tamatave, and Zanzibar to investigate and report upon the kola nut in their respective districts—its cultivation, the trade therein, and its ascertained value as a substitute for ordinary food.

The following reports from the consuls at Sierra Leone, Tamatave, and Zanzibar, are in reply to the foregoing instructions. No replies have been received from the consuls at the other places; when received, they will be published at once.

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[1] *Bulletin of Pharmacy*, 1891, p. 354.

SIERRA LEONE.

Referring to instructions from the Department, under date of August 18 last, I have the honor to state that, with the view of obtaining the best and most reliable information on the subject-matter, I immediately addressed the administrator of this colony, and have the honor to inclose his reply, received to-day, which contains all the information at present available, from public sources, on the subject of the growth, output, export, and value of kola nuts, as regards the colony of Sierra Leone.

GOVERNOR CARDEN TO CONSUL POOLEY.

GOVERNMENT HOUSE, FREETOWN, SIERRA LEONE.
October 16, 1894.

SIR: In reply to your letter of the 17th ultimo, asking for certain information respecting kola nuts, I have the honor to forward herewith copies of memoranda by Mr. Spaine, the colonial postmaster, and Mr. Faulkner, the assistant colonial secretary, on the production, output, export, and prices of this article, which, I trust, will meet your requirements.

The "broad leaf," mentioned in the assistant colonial secretary's memorandum, I understand, belongs to the natural order of the malvaceæ and is known in the West Indies and South America by the name of "Bal leaf."

I have, etc.,

F. CARDEN,
Administrator.

ASSISTANT SECRETARY FAULKNER TO GOVERNOR CARDEN.

Herewith is a memorandum, made by Mr. Spaine, the colonial postmaster, respecting the production of kola nuts. The kola tree produces the nuts in pods containing from three to eight nuts. When full, the pod changes from a green to a red-brownish color, and, if not picked in time, dehisces or falls to the ground.

The nuts, when collected, are laid by for a few days to allow the skin to soften, so as to admit an easy removal when washed.

The nuts are exported in two ways, viz.: fresh and dry. To keep it fresh, care should be taken that the nuts are properly washed with clean, fresh water, not a particle of the decayed skin being allowed to remain on them. After the water has drained, the quantity for shipment is put into a cane basket, inlaid with a kind of broad leaf peculiarly adapted to keep the nuts fresh for a considerable time—say, three months and more—and to keep away worms, which are very destructive to the nuts.

To export it in the dry state entails no trouble. After getting off the skin, by washing, the nuts are split into pieces and dried in the sun, after which they are shipped in ordinary packages, and, so long as kept dry, are not subject to deterioration. The fresh nuts are sold in Freetown at from £3 to £6 ($14.60 to $29.20) per measure, equal to 1½ bushels.

The kola nuts are principally exported to the following places, and those exported from Sierra Leone in 1893 were as follows:

Whither Exported.	Quantity.			Value.	
	Cwts.[1]	*Qrs.*	*Lbs.*		
Gambia	5,552	2	7	£24,130	$117,416.58
Dakar	1,518	0	14	5,921	28,811.59
Gorée	694	1	2	3,055	14,865.63
Senegal	928	0	18	4,471	21,755.89
Windward Coast	291	1	0	1,164	5,664.02
Rufisque	221	2	24	896	4,359.94
Other places	147	2	0	468	2,277.28
Total	9,353	2	9	£40,105	$195,150.93

[1] 1 cwt. = 112 pounds.

POSTMASTER SPAINE TO ASSISTANT SECRETARY FAULKNER.

The kola nut is grown from the nut itself. It should be planted when the nut is fresh, and not in the dried condition in which it is exported to European markets.

Raw kola nuts should be planted in nursery beds, the same as coffee seeds. They will begin to shoot in about five weeks and produce leaves in a week after. It grows with some rapidity in its early stage, and in less than four months, if regularly watered, the plant will be fit for transportation. Its growth after this is slower, according to the nature of the soil. The kola likes a moist, but not damp, soil and thrives best by the side of running brooks. Lands with a flat-rock formation a few feet below the soil will not do, but a loose, porous soil, with a great depth of earth and a clay or sand formation below, will do very well. With a liberal supply of manure and water, during the dry season, the kola tree will come to maturity and bring forth fruit in five years. Where the conditions are less favorable, the tree, will bear fruit two or three years later.

I may add to the foregoing, from personal knowledge, that the natives here, and at Bathurst, Gambia, eat the nuts in the early morning, as a stay against the wants of ordinary food while travelling, and in the evening to induce sleep. Altogether they consider that a general benefit to the human system is derived from the consumption of the kola—say a single nut morning and evening.

ROBERT P. POOLEY,
Consul.

SIERRA LEONE, *October 16, 1894.*

THE APOCYNACEÆ IN MATERIA MEDICA.

By George M. Beringer.

(*Continued from Vol. 66, page 550*).

STROPHANTHUS KOMBÉ.

Strophanthus Kombé Oliv., confounded from the first with *S. hispidus*. The species was created by Oliver from the specimens sent by Dr. Kirk from Zanzibar and those collected by the expedition of Livingstone. The differences which separate this species from *S. hispidus* are, on the whole, small and gradually effaced by the existence of a series of stages in the transit, in such a way that we may admit with Blondel, and with Oliver likewise, that the *Kombé* is only an oriental form of the *hispidus*, possibly a variety. The form *Kombé* commences to appear in the region of the great lakes, then extends as far as the eastern coast. Among other botanical characters are the form and the less length of the calyx lobes in comparison with the tube of the corolla, the consistence of the calyx and bracts, the scarcity of inflorescence, the pubescence more abundant on the leaves, the size of the fruit, the caducity of the bracts, the considerably much larger seed, the abundance and length of hairs on its surface, the increased length of the awn and of the shaft, the color of the seed more or less green, the great length of the funiculus, the elongated form and the number of the lenticels on the fruit, etc., etc. All these characters which seem clear at first sight, become indefinite when we examine a sufficient number of specimens, permitting the verification of the intermediary stages.

The *S. Kombé* inhabits the basin of the Zambesi and the Shire where it serves as the arrow poison. Indicated as about the Victoria Falls, an equal distance from the two oceans, it extends to near the eastern coast (Mozambique), and to the north in the region of the great lakes of the centre.

The plant is analogous with the *S. hispidus*. It flowers in October and November. The various parts, wood, bark, etc., are strongly bitter. The rough pubescence is very marked upon the leaves, the inflorescences and even the flowers. A specimen of the fruit sent by Dr. Kirk measured 32 centimetres in length. The upper extremity tapering at great length, but broken. It is said to be terminated by a stigmatic disk, greatly developed. External surface strongly wrinkled longitudinally, color a dark brown, len-

ticels extremely numerous, transversely elongated and irregular, forming a striation, close, and light brown. The commercial fruit is more or less scraped; bearing at times the remains of the fibres of the mesocarp, appearing as longitudinal striations. More frequently the endocarp alone remains, straight or curved, always fragile and frequently broken, the color yellowish or clear fawn, or a little reddish, often marked by regions more deeply brown, longitudinal and badly limited. The lower extremity is notched, the upper extremity always broken. The internal face is shining, color a little green. It is about 25–35 centimetres in length and 2 centimetres in diameter.

The structure of the pericarp is a little different from that of *S. hispidus* and that of *S. niger;* the parenchyma cells here are sinuous, flattened, or in some regions more open. The sclerotic fibres are nearly constantly associated with a ligneous bundle. The longitudinal fibres are flattened quite regularly.

The *seeds* are striking at once by their color, generally light, their surface strongly tomentose, their silky changeable lustre. The seeds isolated, as they ordinarily arrive in commerce, are in form lanceolate, at times rounded at the base, at other times much more slender even in the same specimen. The dimensions are 11–22 millimetres in length, 2½–5 millimetres in breadth, and 1–2 millimetres thick. The margin is often sinuate, one face quite plane or even concave. The surface is covered with hairs much longer, much closer, more woolly than in the *S. hispidus*, and quite visible to the naked eye. They vary in color from cream white to nearly a brown, with all the intermediary colors and sometimes even with a little different tint upon the two faces of the seed. But the color ordinarily is a greenish gray or a greenish yellow. From handling the hairs drop off and the color then becomes a little more deep. The raphe is ordinarily well marked, very prominent on one side, and quite long. The fracture is white or grayish; the odor is specially well marked, but only if we scrape the seed; the taste is atrociously bitter.

The awn which surmounts the seed is very handsome; the color a little grayish in mass, and is borne upon a very long shaft of which the naked part is always much longer than the plumed part, but not three or four times as long, as some one has said. The naked part generally 4–5 centimetres and the plume 3–4 centimetres. The hairs

are whitish, silky, brilliant, often 5½–6 centimetres or more long, always easily broken. They spread quite well without becoming entirely horizontal. The naked part of the shaft is more resistant than that of the *hispidus*. It is sinuous and of a pale yellow color. The albumen and the embryo are very similar to those of *hispidus*. The radicle is quite long and the cotyledons very thick. The hairs retain so much air that the seed floats a long time in water.

We may distinguish three varieties based upon the anatomical structure, and in these may exist yet others. The first variety is the largest and possesses a longitudinal projection on the ventral face, quite sharp, with the thin borders folded and the dorsal face quite convex, turned over at times like a tuft of moss.

The second variety is more attenuated towards the base, the point, ordinarily asymmetrical, shows an abrupt depression upon the dorsal face; the hairs are longer and changeable.

The third variety is less lanceolate, more sharply attenuated at both extremities; the ventral face much less flat; the tufted part a slender filament that becomes spread about the middle of the ventral face. It seems that the anatomy differentiates these forms not yet referable to definite species. In the external layer the thickenings are quite varied in the forms. The second tegumentary layer with the flattened cells more or less dilated between the depressions of the tegmen; in the albumen, the cell walls vary in thickness and aspect. In none of these are crystals of calcium oxalate. The action of sulphuric acid is the more remarkable upon this seed so rich in *Strophanthine:* scarcely is the section placed in the reaction than an intense green coloration is revealed in the entire thickness of the albumen; then rapidly likewise, but less, about the tip and its immediate neighborhood; the coloration shows in the embryo, occasionally, with a bluish tint; the color is always less bright than in the albumen. Shortly the aspect changes: the albumen becomes greenish yellow, while the embryo passes to an intense blue. Finally, it gradually assumes a reddish or even greenish tint with here and there a few red streaks.

STROPHANTHUS PAROISSEI.

S. Paroissei Franch. an African species, inhabiting French Guinea to south of the Senegal. The plant is but little known, bears the indigenous name of Bini-bande, and presents branches

covered with lenticels and relatively small leaves. The follicle seems quite characteristic, very shrunken and obtuse, rounded about the summit, 18–20 centimetres in length. The naked part of the awn or shaft is nearly 3½ centimetres, Franchet says 4–5 centimetres. The plumed part always quite small, 18–20 millimetres. The hairs of the awn are quite long, nearly 3 centimetres, white, slightly yellowish, fine, brilliant and silky.

The seed is lanceolate, the form occasionally somewhat asymmetric, 10–15 millimetres in length, 3–3½ millimetres in breadth, and 1½ millimetres in thickness. The posterior extremity is rounded, the anterior lengthily attenuated into a very fragile shaft. The surface chocolate brown, covered with short, crowded brown hairs easily seen with a lens or even with the naked eye. The ventral line is rarely very clear.

This species is important because it inhabits the same regions as the *S. hispidus* and *S. minor* and the seeds closely resemble those, so that the substitution or admixture becomes very certain. The bitterness of this seed is relatively weak.

The first layer of the seminal tegument shows cells with the lateral thickenings quite small, convex, but not at all hemispherical. The second tegument is composed of cells extremely crowded and compressed, is a deep brown and is very little thickened. On a level with the raphe the second tegument divides into two, the external zone being very dark, the internal much more clear; between these is placed the fascicles.

With sulphuric acid the section is colored at once a yellow with a little greenish (but it is the droplets of oil which becomes colored), then to a rose (tissue of the cotyledons). But the color is never a decided green. This character, in conjunction with the abundance of the macles of calcium oxalate in the embryo and with the taste but slightly bitter, seems to indicate that the seed is quite poor in active principle.

THE WOOLLY STROPHANTHUS OF ZAMBESI.

Strophanthus asper Oliv.—Although the botanical information is reduced to a minimum, it is evident from a single inspection of the seed that one is dealing with a distinct species. But, after more than six years, the primitive name given by Blondel, "Strophanthus lanieux du Zambèze," remains a *résumé* of our geographic and botanic knowledge upon this subject.

The awn is greatly developed toward the summit, garnished with hair, relatively short, directed obliquely from base to the summit and a little yellowish. The naked region of the shaft is very short.

Regarding the seed itself, it is at once remarkable for its yellowish-white color, shining, owing to the tomentum, extremely thick and long, with a soft woolly fleece. These hairs are directed from the base toward the summit; detached they form in the drug frequently handled small woolly balls. Their length exceeds 3 or 3½ mm. especially upon the margin of the seed.

Under these hairs the color of the seminal tegument is a bright maroon. The form is vaguely lanceolate, rather oblong, sometimes a little irregular, the larger proportionally quite variable; rounded in the rear and a little tapering in front. The anterior portion covered by the hairs frequently difficult to be seen. The ventral face, a little flattened, presenting a small brownish tuft, a little inflated at its termination, towards the middle of the seed. The surface is longitudinally striated. The dimensions are 10 to 20 mm. in length (ordinarily 14 to 16), 3 to 4 mm. in breadth and 1½ to 2 mm. in thickness.

Macerated in water the seeds alter rapidly, soon exhaling a very disagreeable odor. The albumen is grayish-white, less horny, less cartilaginous than in the other species. The embryo is dull white with thick cotyledons and a radicle infinitely shorter than in the *S. hispidus* or the *S. Kombé*.

The transverse section shows that in the external layer the lateral cell thickenings are very little convex, and gives to the section the aspect of a lenticular fusiform body by coalescence with the corresponding thickening of the neighboring cell. The second layer of the tegument is formed of cells much flattened and nearly indistinct. The cells of the albumen and the thick embryo are relatively small.

With concentrated sulphuric acid, the cotyledons give gradually a bright rose coloration, commencing about the vascular bundles. The color is much less intense in the albumen. In a few sections the red color is preceded by a yellow coloration. After one hour the albumen becomes red and the embryo violet.

THE GLABROUS STROPHANTHUS OF GABOON.

Strophanthus Sp.? Important as have been the numerous expeditions of M. Vincent, Dr. Bellay, etc., and the physiological studies

by Polaillon and Carville and the chemical investigations by Gallois and Hardy, Catillon, Arnaud, etc., these seeds can not yet be referred with certainty to any species botanically determined. According to M. Franchet, it is a fact, however, remarkably interesting: that in all the Strophanthus with glabrous seeds (all the Asiatic species are in this class), there exists a constant relation between the absence of all villosity and the length of the point that terminates the anther. Now among the numerous African Strophanthus, two only present this character of the anthers, the *S. gratus* Franch. and *S. Tholloni* Franch. which inhabit precisely the region of the origin of *S. glaber*. According to Thollon this second species bears at Gaboon the name of *Onaïe*. It is thus allowable, with Franchet, to attribute this seed to one or the other of these plants, provisionally and the rather to *S. gratus* which is likewise from the Gaboon, while the *S. Tholloni* is from the regions of the rapids of the Ogoway consequently more to the East.

The *S. gratus* Franch. (*Roupellia grata* Wall et Hook., *Nerium guineense* Brongn., etc.) is a small tree, according to Griffon du Bellay, but more probably a liane. The plant inhabits Guinea, the Gaboon and Sierra Leone, whence it was introduced into culture by Whitfield under the name *S. Stanleyanus*.

The *S. Tholloni* Franch. is probably the species of which the fruits were sent by Thollon containing seeds very analogous to those of the *S. glaber*. It is a long liane of western Africa inhabiting the French region of the Congo, especially the course of the upper Ogoway and the Cameroon, and its extent may be quite far towards the centre of the continent. The lobes of the corolla are short and sharp in the *S. Tholloni* and nearly round in *S. gratus*.

The *S. glaber* serves for the fabrication of the arrow poison in this district.[1] For a long time the seeds were confounded with those of *S. hispidus*, from which they may be easily distinguished.

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[1] The bark and leaves are poisonous, but less so than the seeds. To obtain one kilogramme of the seed 150 pods must be collected.

It is this seed which is employed for the *kombé poison*. The seeds deprived of their awn, are beaten between two stones, and the paste worked up with a knife into a creamy consistence by the addition of a little water or certain vegetable juices, and becomes a red color from exposure to air. This paste is applied to the points of the arrows or they are rolled in the substance, to which is previously added some adhesive ingredient (the mucilaginous bark of a Tiliaceæ, the latex of a Euphorbium rich in caoutchouc, the juice of the

Each follicle is 30 to 35 cm. in length, strongly ligneous and very thick. The exterior surface is brown or reddish, with oval lenticels. In its commercial form, it is bound with the leaf of a palm. The endocarp is fusiform, swollen about the middle 3 to 4 cm. in diameter. The color externally is yellowish to brownish yellow. The surface is quite smooth, dull, non-striated. The interior surface is fawn colored, uniform, shiny, with a brilliant silkiness.

The seeds are much shorter than the other species studied. The shape of the isolated seed is lanceolate with the base ordinarily rounded or truncated and the summit lengthily attenuated with the margins more or less sharp, especially at the base, oftentime somewhat undulated, always somewhat flattened, never cylindrical, the seeds relatively large averaging 13 to 16 mm. in length by 3 to 4½ mm. in breadth and 1 to 1½ mm. in thickness. The dorsal face clearly convex, the ventral flat or even concave. A small keel exists at times near the shaft upon the dorsal face. The surface of this grain is absolutely glabrous and presents only the longitudinal plaitings. The color is an ochre-yellow, fawn, or cinnamon, but often deeper or greyish. The appearance is waxy, dull, tarnished; the fracture is horny, whitish or gray; the odor is especially well marked; the taste extremely bitter. It requires about 35 seeds to weigh 1 gm. The naked part of the shaft is very short (about 1 cm.) in comparison with the plume, which often attains 4 cm. The hairs of the same are sometimes nearly 7 cm. in length; they are numerous, silky, brilliant, fine, fragile, white, viewed in mass yellowish or grayish and diverging, describing a graceful curve.

The envelope is relatively very thin; the albumen thick, cartilaginous, transparent; the embryo is not thick, the radicle is long as in the *hispidus* and *Kombé*.

On transverse section the seed shows first the external layer of the tegument with the thickened cells large and short, a little larger

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petiole and leaves of two indigenous plants not determined, etc.). The substance dried, the arrow is ready. The effects are very rapid, and the game wounded falls within the limit of one hundred metres. The hunter hastens then, to excise with a knife, all around the wound, or better, forces in the wound the juice from a branch of Adansonia digitata. These precautions taken, the game may be eaten with impunity. The act of poisoning their neighbor flourishes among the Gaboonese with all its splendor, and the *Inee* takes the first rank among those numerous powders, the recipes of which these savages religiously transmit as an inheritance.

toward the internal region. The second seminal zone is strongly compressed especially on the inside and the first layer of the albumen is strongly thickened on the outside. The cells of the embryo are often not distinct in outline; they are rich in oil.

With concentrated sulphuric acid the coloration is effected slowly and is never green. At first yellow, then becomes a bright rose. The rose appearing in the neighborhood of the vascular fascicles, and remaining more deeply so there. Finally, very slowly, a violet color is produced.

STROPHANTHUS DIVARICATUS.

S. divaricatus Hook. et Arn., *Pergularia divaricata* Lour.; *S. divergens* Grah.; S. dichotomus β Chinensis Ker. This species occupies the sea coast of China. The carpels are strongly divergent and make with each other an obtuse angle. The follicle is relatively small, 13–14 cm. in length and nearly 4 cm. in diameter; the fruit is quite slender and the base strongly notched about the insertion of the peduncle. Externally it is blackish brown, strongly striated longitudinally, and here and there a little yellowish or reddish in places. The interior is smooth, greenish yellow and generally dull. The seed is 15–17 mm. in length by 3–3½ mm. in diameter and 1–1½ in thickness, with margins a little undulate. Color a blackish grey to deep brown. The ventral face bears a longitudinal line, brighter in color, and running nearly the entire length. The naked part of the shaft or awn is very short, 4–6 mm., the plume is much longer, 2–3 cm., and brighter in color.

The hairs of the awn are white, in mass grayish, quite long, 3½ to 4 cm., and relatively less fragile and more rigid than in the other strophanthus. They are directed forward here horizontally, then little by little they return to the rear, passing even beyond the body of the seed. The attitude is inverse to those of the *S. Kombé*. The taste is much less bitter than that of *S. glaber*. With concentrated sulphuric acid the albumen and the embryo give a red, orange coloration.

Strophanthus Caudatus, Kurz., *S. dichotomus*. A.—P. DC. This species occurs in Java, India, Tonquin, Singapore, the Malay peninsula, and is cultivated at Reunion.

The variety, *Marckii*, inhabits India and Malacca, and, according

to Franchet, the seed greatly resembles that of *S. glaber* of Gaboon. It is feebly bitter.

FALSIFICATIONS.—The substitution of one sort for another is frequent, as well as the admixture of the various products of different species. The admixture of seeds, which had been previously extracted with alcohol, is likewise a fraud, to which attention is directed. The frightfully bitter taste of strophanthus is somewhat reduced by this treatment, and an excellent character for its detection is the appearance of the seed which becomes dull, and of a greenish-brown color, with the hairs agglutinated by the resin which is dissolved by the alcohol. The distinction between the seeds foreign to the genus, is quite easy, a glance of the eye ordinarily suffices. The single falsification of this nature which is really serious, is the substitution of a seed, at first attributed to a *Wrightia*, or to *Holarrhena antidysenterica*, but which E. M. Holmes has proven to be derived from *Kickxia africana*, Benth. This seed is a uniform chocolate-brown color, attenuated at both extremities, inflated spindle-like about the middle, and twisted in an S, and bears on one face a depressed line. The surface examined with a lens, appears longitudinally striated. Dimensions, 9 to 16 mm. long, 2 to 2.5 broad at the middle, and 1 5 to 1.8 thick. The fracture is clear and horny, brownish-white; the odor resembles that of the strophanthus, and the taste is extremely bitter.

The seeds are provided with awns[1], directed backward in the fruit. These awns are formed of a straight and rigid axis, in the neighborhood of 1 cm. long, cylindrical, and slender, the silky hairs which it bears, attain 5 cm. in length, and are very delicate, and brilliant; in color, white, slightly yellow.

A transverse-section shows the cotyledons broad and thin, sinuous, and folded upon themselves, very different from those of the strophanthus. The external layer is formed of irregular, large, brown cells, often badly limited, but without the characteristic circular thickenings. The cellular walls of the albumen are very thick, and the cells of the embryo contain numerous macles of calcium oxalate.

The section treated with sulphuric acid gives a yellow coloration

[1] According to E. M. Holmes, this seed is destitute of an awn, the tuft appearing like a plumose awn, being really the hairy funiculus or stalk, by which the seed is attached to the pod.—G. M. B.

in the embryo, which then changes to an orange and then a red wine lees color, which persists for a long time. The liquid likewise becoming strongly colored.

CHEMICAL CONSTITUENTS OF STROPHANTHUS.—In 1865, Pelikan and Vulpian made the first physiological study of strophanthus with a hydro-alcoholic extract of seeds brought from Africa by Griffon du Bellay. In 1869, Fraser published his first work giving the chemistry and therapeutics. He studied in reality, not the *S. hispidus*, but the *S. Kombé*, and applied the name *strophanthin* to a principle which he isolated imperfectly and which he supposed to be an alkaloid. Then Legros made a series of experiments with the poisoned arrows of the Pahouins. In 1872, came the experiments of Palaillon and Carville, who employed the *S. glaber* likewise under the name of *S. hispidus*. In 1877, Gallois and Hardy in their analyses obtained results different from those of Fraser, which now is fully explained, as instead of the *S. Kombé* employed by Fraser, they used *S. glaber*. They isolated two substances: the one *Inéine* extracted from the awns, a body with alkaloidal properties and peculiar physiological action, but of which the existence even was afterwards contested by Elborne and by Gerrard; the other, the *strophanthin* crystallizable, separated from the seeds alone, and which according to these authors was neither an alkaloid nor a glucoside. Catillon in numerous analyses of the products of various origin obtained different *strophanthins*, some amorphous, others variously crystallized. Fraser, Adrian and Bardet, Catillon etc., showed the glucosidal nature of the principle and admitted the co-existence in the strophanthus of another body, alkaloid according to some, glucoside likewise according to the others. Finally, the magnificent work of Arnaud proved the absence of *strophanthin*, properly named, in the *S. hispidus*, its presence in *S. Kombé*, the replacement of the *strophanthin* by *ouabain* in the *S. glaber*. He gives the composition of these bodies, and indicates the formulas, and shows finally the relation between these two important substances, of which the one (strophanthin) is a higher homologue of the other (ouabain).

The *strophanthin* from *S. Kombé* is a non-nitrogenized glucoside with all the characters of the glucosides and readily yields with dilute acids glucose and strongly toxic substance, *strophanthidin*, of which the effects are not otherwise the same as those of strophanthine.

It crystallizes readily and is neither a glucoside nor an alkaloid. Strophanthine exists in *S Kombé* in the proportion of 0.4 to 0.9 per cent., while ouabain is furnished by S. Glaber to the extent of 4.5 to 5 per cent.

Strophanthin is accompanied in the seed by another glucoside and by a large proportion of a deep green fixed oil (according to Catillon 32 per cent). Fraser has also separated an acid for which he proposed the name of *kombic acid.* In addition there is contained a resin, mucilage and an albumenoid substance.

PHYSIOLOGICAL AND THERAPEUTICAL ACTION.—It was not till about 1885, that physicians following Fraser's experiments commenced to employ strophanthus. For a long time the results were contradictory and confusing. The same cause of errors which were fallen into in the chemical studies, appear here, the mixing of seeds, improperly named or falsified, occasioned differences, and the results were not comparable. On the whole, strophanthus is a muscular poison, acting upon all the striated muscles but more especially upon the heart. The action upon the heart can be obtained with the exclusion of all other action and with neither accumulation nor gastro-intestinal troubles. It seems established that *strophanthin* is not diuretic, nevertheless *strophanthus* is distinctly so. In physiological dose strophanthus augments the force and the amplitude, diminishes and regulates the number of the pulsations. By a toxic dose the paralysis of the heart is accompanied by dyspnœa, nausea, vomiting, weakness and muscular resolution. It is certain that its direct action is rapid and that it is well tolerated.

In answer to the query which strophanthus should be employed? the author favors the adoption of the *Strophanthus Kombé* for pharmaceutical uses for the reasons that it is most frequent in commerce, is very active and quite easily recognized.

ANDERJOW SEEDS.

The seed properly known under this name is that of the *Holarrhena antidysenterica.* Conessi bark is a product from the same tree. Both of these drugs have been admixed with, or entirely substituted by, inert products obtained from *Wrightia tinctoria*, or other species of *Wrightia.* The products of *Alstonia scholaris* have likewise been confused with these drugs. These substitutions explain the failures that have been obtained in Europe with drugs so universally employed in India.

In the appendix to the Pharmacopœia of India, by Waring, Wight has established the distinctive characters of these three trees in which the size is the same, the barks latex bearing and scaling off in strips; the flowers are white, and the inflorescences identical, the follicles long and slender and united in twos, the seeds garnished by tufts of white hairs. In *Holarrhena* and in *Wrightia* the leaves are opposite, oval. rounded at the base and attenuated at the apex, while in the *Alstonia* the leaves are verticillate, attenuated at the base and rounded at the summit. In *Holarrhena* the tube of the corolla is two or three times longer than the calyx, twisted to the left in æstivation, with naked throat, without appendages, stamens included and inserted in the dilated part of the tube. In the *Wrightia tinctoria* the tube is relatively shorter, prefloration twisted to the right, the sagittate stamens exserted, forming a cone about the stigma, and a crown of filamentous glands laciniate, velvety. The disposition of the hairs borne by the seed is likewise quite characteristic; in the *Holarrhena* the tuft of delicate silky white hairs is borne at the upper extremity of the seed; in the *Wrightia* it is the lower extremity, and in *Alstonia* both extremities are ornamented.

HOLARRHENA ANTIDYSENTERICA, Rob. Br. (*Nerium antidysenterica*, L. (in part). *Echites antidysenterica*, Roxb. *Chonemorpha antidysenterica*, G. Don. *Holarrhena pubescens*, Wall. *H. Codaga*, G. Don. *H. malaccensis*, Wight). This is a shrub, or at most a small tree, of which certain forms are glabrous and others tomentose, abundant in the mountains and dry forest regions of India. It is known in the various regions under a multitude of vernacular names.[1]

[*To be Continued.*]

[1] Karra, Kora, Keor, Kuar, Kari, Dhudi, Kogar, La-thou, Inderjaw, Dudhuki-Lakri, Kureya, Kaureya (Hind), Vepali, Veppanla, Veppalay, Kulappalaivirai; Kodoga-pala, Pala-chettu, Giri-mallika, Kalingamus, Kodisa-pala-chettu, Kodisa-pala, Kola-mukki-chakka, Kutajamu, Pedda-ankudu-chettu. Palavarenu, Ankudu, Palla-coodija, Manoopala, Girimallika, Inderjo, Dowla-koora, Koora, Pomdhra-koora, Dood-kora, Conapola, Koorchi, Curayja, Inderjauschiren, Palla-patta, Kiam, Kachri, Dudkuri, Tiwajs, Lissan-el-asafeer, Caraja, Cutaja, Amkudu-vittum, Dadhi-Ruar, Ankria, Kachii.

EDITORIAL.

It has always been the aim of the management of THE AMERICAN JOURNAL OF PHARMACY to first publish original papers on subjects relating to pharmacy, and then as far as possible to furnish abstracts of foreign communications. Not less than forty-eight pages are issued monthly. During the past year, however, this has been found insufficient to include all the original contributions offered, and it is probable that sixty-four pages will be the usual size of the JOURNAL for 1895. By this means we hope, in addition to the original articles, to give an occasional review of the latest developments in the various departments of pharmacy. A review of industrial chemistry for the year 1894 has been promised by an authority on that subject.

ADVERTISED THEMSELVES INTO FAME AND FORTUNE.

It is to be regretted that such an eminently respectable body as the *National Wholesale Druggists' Association* should be on the road to domination by a few "patent medicine kings."

Coincident with the autumn meeting of this Association in New York, the *Times* of that city commented on these proprietary manufacturers as follows:

> They were men, any one of whom could have convinced one of the worthlessness of gold mines as compared with printer's ink. Their names are more familiar to the people of the United States than the names of the members of the President's Cabinet. They were men who advertised themselves into fame and fortune.

Then followed a short biographical sketch of each, which some of the pharmaceutical journals, who profess to live for the benefit of the pharmacist, have published, with the view of still further advertising their "kings."

While this article in the *Times* was written with the intention of lauding these men, to one who knows the true inwardness of the patent medicine business, it must have exactly the opposite effect. Nothing was said about the value or worthlessness of their bastard remedies; these men simply "advertized themselves into fame and fortune."

To put it more truthfully, they simply preyed on the imagination and resources of the poor and ignorant and made themselves rich.

A few days ago the writer received at his residence, through the Post Office, what professed to be a newspaper, but really was a circular from one of these "nostrum kings." This circular should never have been forwarded by the Postal Department; it was filled with the portraits and testimonials of such a miserable class of unfortunate women, and with such a host of "prayerful" letters from a still more detestable class of so-called Doctors of Divinity, about their wives, as to make it utterly unfit to appear in any respectable household.

The American Pharmaceutical Association kept the whole patent medicine subject out of its meetings for many years, but now one may listen to druggists, doctors and professors eloquently denouncing the "cutter" and vividly picturing how some "new plan" or "league" will enable the pharmacist to once more establish himself in this miserable traffic.

There is but one way for the pharmacists of the country to combat this business, and that is to combine against it. The physician and pharmacist could unite on this platform, and now is a very opportune time to do it, while the physician is thinking about conducting a little pharmacy of his own in the shape of a chest of "tablet triturates" and "compressed tablets."

JOHN M. MAISCH.

The biography of Professor Maisch, published in this Journal one year ago, gave a complete list of his contributions to pharmaceutical literature so far as this country is concerned, but we were recently supplied with a list of his papers contributed to *Buchner's Repertorium*, and consequently in the German language. The following are the titles and references, as translated and compiled by Mr. Hans M. Wilder, who thinks it covers all the contributions in German:

(1) American Eclectic Resinoids. Vol. vi, p. 481–487. 1857.
(2) Sale of Poisons in U. S. Vol. vii, p. 267–271. 1858.
(3) Fluid Extracts in U. S. Same vol. and year, p. 297–304.
(4) Manufacturing Pharmacy in U. S. Vol. viii, p. 433–437. 1859.
(5) Alumen Ustum. Vol. ix, p. 127–129. 1860.
(6) U. S. Ph. Same vol. and year, p. 145–149.
(7) Mineral Water Trade in U. S. Vol. x, p. 257–259. 1861.
(8) Flora of Philadelphia. Vol. x, p. 289–294 and 259–364. 1861.
(9) Standing of the Pharmacist in the U. S. Army. Vol. xi, p. 294–299. 1862.
(10) Snake Bite Remedies in U. S. Same vol. and year, p. 352–356.

Mr. Wilder also informs us that the penalty imposed on Prof. Maisch for his connection with the revolution of 1849 was 4½ years at hard labor in the penitentiary. Little wonder he sought the friendly shores of this country to escape such a penalty.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

LES DROGUES SIMPLES D'ORIGINE VÉGÉTALE. Par MM. G. Planchon et E. Collin. Tome premier. Paris. Octave Doin. 1895. Pp. 805.

This is a magnificent work on the simple drugs of vegetable origin. Beginning with the cryptogamia, the first article is on the varech (*Fucus vesiculosus*, L.), then follow in systematic order the various members of this series, which occupy sixty pages. The phanerogamia are then considered as far as the *campanulaceæ*, which terminate Volume I. The second volume is promised for the end of 1895.

The whole subject is treated in a systematic manner; for instance, each drug is described under the following heads: *origin*, *description*, *structure*, *chemical composition* and *uses*. Under some of the more important drugs there are given, in addition to the above, *the history*, *commercial varieties* and *substitutions*. There are 626 illustrations distributed through the volume, which greatly enhance its value. These, in many articles embrace, the whole plant, the part used, the structure and in some cases the starch.

Rhubarb is especially well-described and illustrated, the figures of the various commercial varieties, as well as those of the anatomical structure, being particularly noteworthy.

This volume is one of which the authors have the best of reasons to feel proud, and we shall await the appearance of the second volume with some impatience.

YEAR-BOOK OF PHARMACY, 1894. London: J. and A. Churchill. This valuable publication is made up of about 250 pages of abstracts and of over 200 pages of the transactions of the British Pharmaceutical Conference, held at Oxford, in August, 1894. The papers read at that meeting were given in

abstract in the September number of this journal. These papers are of such a character as to bear reading in full. The one on "Animal Extracts," by C. E. Stuart, is of especial value to the pharmacist.

MEDEDEELINGEN UIT 'S LANDS PLANTENTUIN. Eerste Verslag van het Onderzoek naar de plantenstoffen van Nederlandsch-Indie door M. Greshoff.

Communications from the Government Botanical Gardens Buitenzorg. First report onthe active principles of plants growing in Dutch East India. By M. Greshoff. Batavia, 1890. Part VII.

The subject matter is as follows:

I On carpaine (an alkaloid; yield 0.25 per cent. of the dried young leaves).—This is not the peptogenic principle of Wuertz and Bouchut—it is chiefly found in the parenchyma of the leaves, but in very minute quantities in other parts of the plant. Physiologically it appears to act on the heart, but does not seem to be very poisonous—a toad requires about 10–15 mgm. Greshoff recommends for medicinal use the hydrochlorate, which contains 82 per cent. of the alkaloid.

II. First contribution to the pharmacological chemistry of Leguminosae, growing in Dutch East India. *Derris; Pachyrhizus; Sophora; Erythrina; Cassia; Crotalaria; Millettia; Acacia; Albizzia; Pithecolobium*, species. (Derrid; Pachyrhizid; Sophorin; Erythrine, etc.)

III. Apocyneæ of Dutch East India, containing alkaloids. *Melodinus; Leuconotis; Rauwolfia; Hunteria; Pseudochrosia; Ochrosia; Kopsia; Vinca; Alstonia; Voacanga; Tabernamontana; Rhynchodia; Chonemorpha.*

IV. *Cerbera Odollam.*

V. *Laurotetanine found in Litsaea; Tetranthera; Haasia; Notaphœbe; Aperula Actinodaphne; Hernandia; Illigera; Gyrocarpus; Cassytha*

VI. Plants of Dutch East India, containing Hydrocyanic acid:

(1) Containing amygdalin. *Gymnema; Pygeum.*

(2) Not containing amygdalin. *Lasia; Pangium; Hydnocarpus. Gymnema latifolia* contains laurocerasine; the first time this principle has been found in a plant not belonging to Amygdaleæ (Gymnema is an Asclepiadaceae) 100 gm. fresh (?) leaves yielded 0·354 gm. AgCN. Dried in an exsiccator the leaves yielded no oil of bitter almond, even after months, on distilling with water, but quite a quantity after addition of emulsin.

Pygeum parviflorum and latifolium. The fresh bark of *latifolium* yielded a distillate, containing suff. HCN to form 89 mgm. AgCN from 100 gm. The fresh leaves yielded 31 mgm. AgCN = 0·006 per cent. HCN.

100 gm. fresh bark of *parviflorum* yielded 98 mgm. AgCN = 0·02 per cent. HCN.

Lasia Laureiro (*Aroideæ*). On macerating freshly powdered spadix twenty-four hours with 1 p. c. sulphuric acid water, and distilling with the usual precautions, Greshoff obtained from 100 gm. about 0·047 gm. AgCN. But on distilling the finely powdered spadix without previous maceration and without adding acid, he obtained nearly double the quantity; probably still more is originally contained in the spadix, a part of the hydrocyanic acid being necessarily dissipated by the heat (30° C.) necessary to drying it, previous to the

powdering. Greshoff instances that exposure to a colder climate even occasions loss of acid, relating that whole (uncut) cherrylaurel leaves, collected in November, distilled in Holland, yielded 0·086 and 0·133 per cent. HCN, while leaves from the same tree, but cut, yielded only 0·068 and 0·097 per cent. HCN.

Pangium edule :—100 gm. fresh seed yielded 0·357 gm. AgCN = 0·07 per cent. HCN. 100 gm. dried bark—0·063 gm. AgCN = 0·012 per cent. HCN. 100 gm. of the fruit-pulp—0·270 gm. AgCN. The young leaves contained 0·34 per cent. HCN (fresh leaves—1·676 gm. AgCN from 100 gm.). A tree of Pangium edule is calculated by Greshoff to contain at least 350 gm. of HCN.

Hydnocarpus inebrians and *alpinus* yielded respectively 187 and 41 mgm. AgCN.

MEDEDEELINGEN, ETC., ETC. Beschrijving der giftige en bedwelmende planten bij de vischvangst in gebruik. Door M. Greshoff.

Description of the poisonous and narcotic plants employed in fishing. By M. Greshoff. Batavia. 1893.

Greshoff intended originally to describe only such plants as were in use in Dutch East India for the above purpose, but soon found that many plants indigenous to the Indias, while in use elsewhere, were not used in the Dutch islands, and therefore has given quite a monograph concerning such plants, whether used in the East or in other countries.

Pp. 169 contains the literature examined by Greshoff; 171–175 the list of plants in the order in which they are treated; 176–179 the families, and 180–201 an alphabetical list of genera and species.

In his descriptions he quotes from many sources, using generally the words of the authors.

The number of plants mentioned is 233.

An appendix contains historical notices about the genus Verbascum, in relation to their use in stupifying fish. H. M. WILDER.

CONSULAR REPORT, vol. 46, No. 170.

The article in this number that will interest pharmacists is on "The Vanilla Bean in Mexico," by Consul Charles Schaefer, at Vera Cruz.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 18, 1894.

On motion of Professor Trimble, Joseph W. England was called to the chair, the reading of the minutes of the last meeting was dispensed with. The registrar announced that there had been received forty-one volumes of the *Reports of the Finance Committee of the Senate*, and two volumes of the *Ethnological Bureau Reports*, by J. W. Powell, Director.

Professor Remington introduced his sketch of Henry Troth, by stating that he had tried for a number of years to obtain some permanent memorial of the founder of the College, Henry Troth, and, through the kindness of his daughter, Mrs. Henrietta M. Townsend, who gave it, he was enabled to present it to the Board of Trustees at their last meeting on the 4th inst. It is said to be a most excellent likeness of him at the time the College was founded, when he was in his twenty-eighth year. The paper was listened to with much interest, and referred to the Publication committee.

A paper upon *Dilute Hydrobromic Acid*, by Mr. LaWall, was read by Professor Trimble. It elicited some discussion as to the best method of preparing it. Prof. Trimble stated he had made considerable quantities of it at different times and with uniformly good results, by using Squibb's process.

Mr. Beringer said he thought that the preferable method was by treating bromine water with hydrogen sulphide. Mr. Thompson asked the proper strength, and the reply was that it should be a ten per cent. solution.

Mr. England read a paper upon the *Florida Sponge Industry*, by Mr. Wm. B. Burk. Mr. Thompson asked whether all sponges were bleached, and Mr. Hancock wished to know whether sponges were cultivated at the present time in Florida. Mr. England said that Congress had been asked to place a duty on sponges, and Mr. Burk had informed him that there was in Florida a sponge plantation; and it was stated that the bleached sheep wool sponge was not as strong as the unbleached.

Mr. Kebler asked what was the limit of sand and insoluble matter; that he had seen samples with as much as 26 per cent. of refuse matter in it. Mr. Beringer stated that he had found as much as 50 per cent. of sand and inorganic matter that could be beaten out. Mr. Kebler thought that there should be a standard of maximum of foreign matters fixed, so that dealers could know what to depend on.

A paper entitled *Laboratory Notes*, by Mr. Kebler, was read.

The first on *Pure Delaware Honey*.

Professor Remington stated that the reason honey had been omitted from certain official preparations, was the great variableness even in honey that was really pure natural honey.

Mr. Thompson thought it is not to be found in commerce of a standard quality, but although genuine it may be of variable composition. Mr. Kebler asked whether bees would directly store honey. Professor Remington said he had known of its being tried successfully provided the glucose was flavored (not glucose alone); he had used orange flower water as a flavor, and they readily stored it; the bees, however, did not thrive, as they needed the pollen for bee-bread, and they also required exercise.

(II) *Pyrogallic Acid* was also a subject of discussion.

(III) *Oil of Wine.*

(IV) *Oil of Sassafras.*

Mr. Beringer thought the synthetical oils should not be used to replace those of natural origin, as they generally are wanting in some essential constituent, and more oil is needed to accomplish the same amount of flavoring.

(V) Ipecac was also discussed. These papers were all referred to the Publication Committee.

Mr. Thompson presented a note upon Philadelphia history, written some years since by Thompson Westcott, giving the names of those druggists who were contemporary with Henry Troth, and were influential in founding our College; among the names appear those of John F. Wetherill, George D. Wetherill, Chas. Wetherill, and Sam'l P. Wetherill, Wm. Lehman, Peter Lehman, Algernon S. Roberts, Alexander Fullerton, Jr., Daniel B. Smith, Peter Williamson, and many others whose names are still in the memory of the older residents of our city.

T. S. WIEGAND,
Registrar.

CLASSES

—OF THE—

PHILADELPHIA COLLEGE OF PHARMACY,

SEVENTY-FOURTH ANNUAL SESSION, 1894-1895.

JUNIORS.

Name.	*Place.*	*State.*	*Preceptor.*
A'Becket, Thomas Hopkinson,	Philadelphia,	Pa.	J. J. Moore.
Aikins, James Phil ,	State College,	Pa.	W. S. Glenn, M.D.
Albaugh, Herbert Spencer,	Covington,	O.	A. C. Schofield.
Alexander, Charles Ellis,	York,	Pa.	Geo. W. Fulmer.
Althouse, Harry B.,	Harrisburg,	Pa.	F. J. Althouse.
Altmiller, Charles Fred.,	Hazleton,	Pa.	McNair & Hoagland.
Anderson, Ralph,	Latrobe,	Pa.	Jesse W. Pechin.
Ashmead, Alfred Elliott,	Philadelphia,	Pa.	B. P. Ashmead.
Asnis, Eugene,	New York,	N. Y.	Dr. Model.
Aszmann, Louisa Henrietta,	Philadelphia,	Pa.	H. L. Smith.
Bach, John,	Philadelphia,	Pa.	Wm. J. Pechin.
Baer, Hermanus Ludwick,	Somerset,	Pa.	John N. Snyder.
Bahé, William Franklin,	Chicago,	Ill.	W. A. Brabrook.
Baker, Newton Claire,	Watsontown,	Pa.	Wm. A. Bright.
Baldauf, Leon Kahn,	Henderson,	Ky.	Julius L. Baldauf.
Barr, David Ford,	Philadelphia,	Pa.	B. J. Stathem.
Barrett, Wesley Johnson,	Downingtown,	Pa.	Geo. E. Dennisson.
Barth, Charles,	Philadelphia,	Pa.	W. G. Nebig.
Bartho, Fremont Kessler,	Sacramento,	Pa.	A. S. Jordan & Co.
Bartlett, Hannah Frances,	Vineland,	N. J.	S. Hayhurst, M.D.
Bates, John Phillips,	Mansfield,	Pa.	J. M. Smith.
Bauer, Edward Julius,	Philadelphia,	Pa.	L. G. Bauer, M.D.
Beardsley, Carrie Frances,	Merchantville,	N. J.	Special Materia Medica.
Beavans, Wm. Eugene,	Enfield,	N. C.	P. Fitch, M.D.
Becht, Frederick,	Philadelphia,	Pa.	A. R. Lawson.
Beckett, Josiah Bee,	Woodbury,	N. J.	A. S. Marshall.
Beeler, Aaron Wilson,	Mt. Eaton,	O.	A. W. Blackburn.
Beh, Edward,	Philadelphia,	Pa.	Harry Swain.
Bell, R. A.,		Pa.	G. B. Winebrenner.
Bensinger, George Irvin,	Schuylkill Haven,	Pa.	S. S. Commings.
Berg, David,	Philadelphia,	Pa.	Special Chemistry.
Berkenstock, Oscar,	Tannersville,	Pa.	C. G. A. Loder.
Bingman, Harry Clayton,	Jersey Shore,	Pa.	J. F. Gray.
Blair, Geo. Thomas,	Shippensburg,	Pa.	J. C. Altick & Co.
Boose, Wm. Engelhart,	York,	Pa.	G. W. Fulmer.
Booth, Harry Emanuel,	Camden,	N. J.	A. J. Frankelberger.
Boyce, John Christian,	Philadelphia,	Pa.	H. J. Batdorff.
Breithaupt, Alphonse Peter,	Philadelphia,	Pa.	C. A. Werckshagen.
Brown, Edward Pennelton,	Winchester,	Va.	
Brown, James Lawrence,	Philadelphia,	Pa.	McClure, Heritage & Co.
Brown, Roscoe James,	Oxford,	Pa.	W. S. J. Brown.
Breuckmann, Walter,	Philadelphia,	Pa.	Emil Jungmann.
Brugler, Elmer Geo.,	Bloomsburg,	Pa.	J. H. Mercer.
Brumbaugh, Albert Sylvester,	Mansfield,	O.	Silas Shull.

Name.	*Place.*	*State.*	*Preceptor.*
Buehler, David Alexander,	Gettysburg,	Pa.	L. M. Buehler.
Buss, Marcus,	S. Bethlehem,	Pa.	Milton M. Buss.
Butler, John Bailey,	Newark,	Del.	J. Lehr.
Cameron, Charles Sherwood,	Rising Sun,	Md.	L. R. Kirk, M.D.
Campbell, Emerson,	Martin's Ferry,	O.	G. R. Ralston.
Campbell, Frank Book,	Leetonia,	O.	F. W. Wiedemayer.
Carson, Samuel Thompson,	Philadelphia,	Pa.	Dr. Meredith.
Carstens, Louis Peter,	Davenport,	Ia.	Gust. Schlegel & Son.
Case, Luella,	Delaware,	O.	Francis M. Starr.
Catherman, Isaac Newton,	Selins Grove,	Pa.	Geo. C. Wagenseller.
Chadwick, Samuel Hilton,	Wilmington,	Del.	Z. James Belt.
Charlton, John Edmot,	Baltimore,	Md.	D. W. Fleming.
Clapp, Samuel Clarence,	Milton,	Pa.	C. E. Stout.
Clark, Edward,	Reading,	Pa.	F. X. Wolf.
Clark, Robert Hall,	Union City,	Ind.	I. R. Frey.
Cloud, Norman Henderson,	West Chester,	Pa.	Luther Gerhard.
Coberth, Louis Alexander,	Baltimore,	Md.	
Codori, Simon Jacob, Jr.,	Gettysburg,	Pa.	J. M. Hillan.
Coller, Wm. Warner,	Reading,	Pa.	W. F. Potteiger.
Collins, John Hall,	Philadelphia,	Pa.	Lapp Drug Co.
Comber, Daniel Joseph,	Philadelphia,	Pa.	
Compton, Richard Hal.,	Allen,	Tex.	L. G. McKinstry.
Conklin, Claud Elgin,	Hornellsville,	N. Y.	H. B. Spackman.
Conover, Arthur Bruce,	Dayton,	O.	C. H. Breidenbach.
Cooper, Morris,	Fredericksburg,	Pa.	Jos. H. Garman.
Cowdery, Martin Franklin,	Philadelphia,	Pa.	Dr. Hazzard.
Craig, James,	Glasgow,	Scotland.	F. H. Davis, M.D.
Craig, Ralph B.,	Allentown,	Pa.	Kennedy & Brake.
Crayton, Blair,	Anderson, C. H.	S. C.	Simpson & Son.
Criswell, Edward Ott,	Waynesboro,	Pa.	Mentzer & Claigston.
Crumbie, James Henry,	Philadelphia,	Pa.	Geo. J. Crumbie.
Daniels, Charles Rockford,	Columbia,	S. C.	H. C. Blair.
Davis, Jacob Baumgardner,	York,	Pa.	J. R. Smyser.
Davis, James Joseph,	Scranton,	Pa.	C. Lorenz.
Davis, John Ellsworth,	Salem,	N. J.	W. H. Dunn.
Deane, Charles Howard,	Wilmington,	Del.	J. M. Harvey.
Deardorff, Calvin Abraham,	McKnightstown,	Pa.	J. A. McCurdy.
Deemer, Geo. Morton Hays,	Greensburg,	Pa.	J. V. Stephenson.
Dewees, Wm. Holstein,	Kennedyville,	Md.	McClure Heritage & Co.
Dickinson, Chas. Seymour,	Erie,	Pa.	C. J. Wood.
Donahue, John Linton,	Bloomsburg,	Pa.	Moyer Bros.
Draper, Oscar Carman,	Wilmington,	Del.	W. C. Taylor.
Dreifoos, Benj. Franklin,	Reading,	Pa.	A. Schaich.
Dutt, William,	Akron,	O.	E. H. Buehl.
Dysart, James Lafayette,	Anna,	Tex.	Dr. S. Evans.
Eckels, Frank Huston,	Mechanicsburg,	Pa.	C. A. Eckels.
Ehman, Joseph Wm.,	Warrensville,	Pa.	Milton Huber.
Elliott, Boyce,	Winnsboro,	S. C.	W. E. Aikens, M.D.
Elliott, James Troxell,	Gettysburg,	Pa.	J. M. Huber.
Engler, Howard Samuel,	Easton,	Pa.	O. H. Sterner, M.D.
Entwistle, Albert Henry,	Philadelphia,	Pa.	C. H. Roberts.
Eschbach, Clarence V.	Milton,	Pa.	J. S. Follmer.
Evans, Fannie Cheney,	Malvern,	Pa.	
Failing, Wm. Clark,	Palatine Bridge,	N. Y.	H. C. Blair.
Fellowes, Merrill Elwyn,	Farmington,	Me.	A. W. Pottle.
Fews, Colin Spangler,	Middletown,	Pa.	J. D. McFerren.
Field, Benj. Franklin,	Denton,	Md.	E. P. Stephens.
Filer, Burrett Borngton,	Hammonton,	N. J.	J. Frank Meade.
Flenniken, John Byron,	Uniontown,	Pa.	Frank Huston.
Fluck, Frank Wilson,	Allentown,	Pa.	Peters & Smith.

Name.	*Place.*	*State.*	*Preceptor.*
Flynn, James Francis,	Galesburg,	Ill.	C. D. Latterner.
Foster, Wm. Newell,	Philadelphia,	Pa.	W. H. Saurer.
Franklin, Wm. Oliver,	Atlantic City,	N. J.	T. H. Franklin, M.D.
Frederici, John Koch,	Auburn,	Pa.	C. M. Fry.
Freeman, Josiah Kisterbock,	Philadelphia,	Pa.	R. P. Marshall.
Funches, Cardoza Marion,	Rowesville,	S. C.	
Funk, Clifford Altamont,	Lancaster,	Pa.	J. A. Miller.
Gabriel, Robert Rudolph,	Philadelphia,	Pa.	D. H. Ross.
Garrison, Joseph Miller, Jr.,	Elmer,	N. J.	Theo. Campbell.
Geiger, Walter Samuel,	Reading,	Pa.	J. C. Griesemer.
Genz, George Leonard,	Hazel Green,	Wis.	T. McNeill.
Gessford, Otice Eugene,	Lippincott,	Pa.	Funk & Groff.
Godfrey, Swain T.,	Seaville,	N. J.	G. J. Pechin.
Godshall, Samuel R.,	Souderton,	Pa.	Smith, Kline & French Co.
Goldsmith, Lee,	Philadelphia,	Pa.	H. Wise & Co.
Good, Robert Franklin,	Allentown,	Pa.	Dr. C. A. Seler.
Goodfellow, Charles Rumney,	Germantown,	Pa.	E. M. Wallington.
Gorman, Charles William,	Gouverneur,	N. Y.	S. Felt.
Gorrey, Thomas Francis,	Bloomsburg,	Pa.	W. S. Rishton.
Graham, Harry Edgar,	Chambersburg,	Pa.	J. S. Barnitz.
Grakelow, Ralph,	Philadelphia,	Pa.	I. P. Amick.
Greer, Mary Caroline,	Philadelphia,	Pa.	
Griffith, Oliver Brownback,	Uwchland,	Pa.	C. A. Smith.
Gross, Ernest Alpha,	Wyoming,	Pa.	Dr. Wm. Delker.
Gross, Paul Herbert,	York,	Pa.	R. W. Ziegler.
Hahn, Charles,	Minersville,	Pa.	C. E. Howard.
Haines, Samuel Woolston,	Camden,	N. J.	E. W. Collins.
Halbe, John Peter,	Philadelphia,	Pa.	F. F. Drueding, M.D.
Hance, George Headley,	Philadelphia,	Pa.	R. A. Hance.
Handel, John Conrad,	Philadelphia,	Pa.	D. J. Weidner.
Hannan, Frank William,	Johnstown,	Pa.	Charles Griffith.
Harlow, Charles Mills,	Wyncote,	Pa.	F. W. Brown & Co.
Harman, George Alvin,	Machiasport,	Me.	C. Longfellow.
Harrell, Herbert Dean,	Wheeling,	W. Va.	G. H. Ebeling.
Harris, Clarence Mulford,	Bridgeton,	N. J.	C. S. Ogden.
Harris, Overton Crawford,	Slater,	Mo.	
Harry, Hamilton Maxwell,	Conshohocken,	Pa.	Jas. W. Harry.
Hauck, John Francis,	Philadelphia,	Pa.	E. F. Kessler.
Haus, Ralph Leonard,	Mifflinburg,	Pa.	J. C. Steans, M.D.
Hayes, Edward Albert,	Belvidere,	N. J.	A. S. Wickham.
Hebden, William,	Philadelphia,	Pa.	Caleb Scattergood.
Heckerman, Adam Bruce,	Bedford,	Pa.	M. P. Heckerman.
Heffner, Edgar Franklin,	Centralia,	Pa.	Charles Lashelle, M.D.
Heim, Christian,	Philadelphia,	Pa.	Henry Mueller, M.D.
Heinbach, Frank Walton,	St. Clair,	Pa.	J. L. D. Morison, M D.
Helfrich, Edward Daniel,	Galion,	O.	H. G. Hackedorn.
Hendrickson, Wm. Randolph,	Swedesboro,	N. J.	H. E. Jones.
Henry, Albert E.,	Point Pleasant,	Pa.	P. N. Pinchback.
Henshaw, Harry Pawling,	Bridgeport,	Pa.	Baker & Grady.
Herbst, Frederick,		Germany.	August Hohl.
Herbuveaux, Jules,	Utica,	N. Y.	J. H. Sheehan & Co.
Herzog, Albert,	Washington,	Mo.	E. W. Gallenkamp.
Hess, Daniel Clyde,	Hazleton,	Pa.	A. R. Calhoun.
Hiffmeyer, William Joseph,	York,	Pa.	Wm. Smith & Co.
Hildebrand, Howard Ovid,	York,	Pa.	A. H. Lafean & Bro.
Hippler, Harry Richmond,	Germantown,	Pa.	Wm. C. Bichy.
Hodil, Frank Dilworth,	Sligo,	Pa.	J. R. Murray.
Hoffman, William Shalter,	Washingtonville,	Pa.	J. F. Leavitt, M.D.
Holliday, J. Thomas,	Millington,	Md.	Slaughter & Besore.
Holshue, Charles Raymond,	Shamokin,	Pa.	Dr. F. A. Clark.

Name.	*Place.*	*State.*	*Preceptor.*
Horst, Harry Lewis,	Lock Haven,	Pa.	H. Hilton & Co.
Howard, Horace Emory,	South Hadley,	Mass.	J. J. Ottinger
Hukill, Oscar K.,	Hot Springs,	Ark.	Andrew Blair.
Hundertmark, John Charles,	Cleveland,	O.	Acker Bros.
Hunt, Warren Ernest,	Philadelphia,	Pa.	Jas. C. Perry.
Ingling, Howard Edgar,	Riverton,	N. J.	M. Cowperthwait.
Ink, Charles Thomas,	Columbiana,	O.	C. E. Ink.
Irwin, Wm. Reed,	Atlantic City,	N. J.	Dr. A. D. Cuskaden.
Jacobs, John Taylor,	Wilmington,	Del.	J. P. Williams.
Jacoby, Charles Nicholas,	Fond du Lac,	Wis.	C. P. Loeper.
Jaeger, Charles Frederick,	North Adams,	Mass.	E. E. Bostick.
James, Robert Rosser,	Scranton,	Pa.	Clarence R. Shryer
Jefferis, David Strode,	Philadelphia,	Pa.	Funk & Groff.
Jennings, Isaac Astor,	Philadelphia,	Pa.	
Johns, Frank James,	Mt. Pleasant,	Pa.	W. P. Wingender.
Johnson, Albert Burdis,	Point Pleasant,	N. J.	J. H. Munson.
Johnson, Charlton Graham,	Columbus,	Ga.	Evans & Howard.
Johnson, Ferdinand,	Philadelphia,	Pa.	Special Cemistry.
Johnson, Olive Curtis,	Danville,	Pa.	S. Y. Thompson, M.D.
Jolley, John James,	Philadelphia,	Pa.	F. M. Apple.
Jones, Walter Eugene,	Utica,	N. Y.	E. E. Jones.
Kaufman, Samuel,	Goodno,	Russia,	W. H. Piles' Son.
Kelchner, Charles Eber,	Bloomsburg,	Pa.	G. P. Ringler.
Kessler, Laurence Anthony,	Logan,	O.	F. W. E. Stedem.
Killiam, Wm. Smith,	Wilmington,	Del.	N. B. Danforth.
Kirlin, C. Coleman Hagenbach,	Mahanoy Plane,	Pa.	P. P. Kirlin.
Kline, Frank,	Reading,	Pa.	F. Morse.
Koehler, George,	Philadelphia,	Pa.	E. F. Kaempfer.
Kottcamp, Edward Charles,	York,	Pa.	Alva F. Tod, M.D.
Kramer, George Henry,	Philadelphia,	Pa.	Robt. McNeil.
Krewson, Chester Merrill,	Philadelphia,	Pa.	G. S. R. Wright.
Kunkle, Timothy Osgar,	Newberry,	Pa.	W. E. Kunkle.
Kunz, Charles Cornelius,	Philadelphia,	Pa.	P. P. Klopp.
Kupfer, Harry John,	Corinne,	Utah,	C. W. Newton.
Lachman, Elmer Richardson,	St. Clair,	Pa.	
Langham, John Williams,	Philadelphia,	Pa.	E. B. Kyle, M.D.
Langner, Paul Harry,	Reading,	Pa.	I. J. Brandt.
Laucks, Wm. Irwin,	Philadelphia,	Pa.	W. H. Poley.
Laughlin, Albert Russell,	Newville,	Pa.	C. A. Eckels.
Leap, Percy Duff,	New Martinsville,	W. Va.	Long & Co.
Leas, Charles Wing,	Mechanicsburg,	Pa.	Eckels Bros.
Leighton, Carl Bure,	Philadelphia,	Pa.	R. Shoemaker & Co.
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Levan, Walter,	Gordon,	Pa.	J. E. Gregory.
Lewis, Daniel Wm.,	Vineland,	N. J.	Wm. H. Faunce.
Lewis, Frank Joseph,	Philadelphia,	Pa.	W. F. Thompson.
Lewis, Howard Hornberger,	Reading,	Pa.	G. L. Dengler.
Liebert, Charles Frederick,	Philadelphia,	Pa.	A. G. Keller.
Light, James Raymond,	Lebanon,	Pa.	Geo. W. Schools.
Lightcap, Wm. Edward,	Smyrna,	Del.	G. M. Beringer.
Lincoln, Geo. Washington,	Philadelphia,	Pa.	H. G. Shinn.
Lindsay, James,	Amsterdam,	N. Y.	J. A. Barkuff.
Lippincott, David Alfred, Jr.,	Burlington,	N. J.	H. B. Weaver.
Littlefield, Bradford Allen,	Watertown,	N. Y.	C. E. Van Anamee.
Livingood, Wm. Worman,	Reading,	Pa.	J. C. Sanderson & Co.
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Longmire, Chas. Henry,	Philadelphia,	Pa.	F. P Riedenauer.
Longshaw, Thos. Elmer,	Philadelphia,	Pa.	J. B. Moore.

Name.	*Place.*	*State.*	*Preceptor.*
Luhr, Fred. A.,	St. Marys,	Pa.	A. Müllhaupt, M.D.
Macbride, Wm. Vaughan, Jr.,	Philadelphia,	Pa.	Wm. F. Seiler.
McClellan, Howard Leslie,	Philadelphia,	Pa.	
McCracken, James Henry,	Darby,	Pa.	Harlan Cloud.
McDonnell, Wm. Joseph,	Philadelphia,	Pa.	Chas. P. McDonnell.
McGehee, Hanford Bell,	Staunton,	Va.	Lawson C. Funk.
McHenry, Walter Greenleaf,	Philadelphia,	Pa.	Aquila Hoch.
McLaughlin, Charles Bishop,	Millville,	N. J.	Dr. A. H. Lippincott.
McLemon, Felix Aloysius,	Conshohocken,	Pa.	C. Moylan.
McMillan, Edwin Horbaugh,	Elk Lick,	Pa.	A. F. Speicher.
McMillan, Harry Custer,	Zanesville,	O.	J. R. Johnson.
Mac Nair, Hugh,	Jarretts,	Va.	Lawson C. Funk.
Mahoney, James Norris,	Bridgeport,	Pa.	E. A. Stahler.
Malin, George Lawrence,	Atlantic City,	N. J.	Willard Wright, M.D.
Mangold, Wm. Ball,	Zanesville,	O.	W. A. Musson.
Maples, Murff Ford,	Pueblo,	Col.	A. C. Daniels.
Marshall, Charles Gross,	West Fairview,	Pa.	R. C. Marshall, M.D.
Marwood, Albert Victor,	Camden,	N. J.	Dr. Wm. Shafer.
Matthews, Chas. Morgan,	Philadelphia,	Pa.	Dr. A. Dalton.
Matusow, Harry,	Minsk,	Russia,	C. H. Bohn.
Maybury, Edward Daniel,	Allentown,	Pa.	R. M. Sommers.
Meginniss, Wm. H.,	Wilmington,	Del.	N. B. Danforth.
Meier, August Joseph,	Germany,		Geo. J. Crumbie.
Mellon, Harry Winfield,	Tremont,	Pa.	A. Wasley.
Metz, Abram L.,	Chambersburg,	Pa.	Dr. C. B. Lowe.
Metzler, Claude Dallas,	Harrisville,	Va.	Jas. A. Ferguson.
Miller, John Henry,	Ephrata,	Pa.	W. G. Ruff.
Montgomery, John Custice,	Chambersburg,	Pa.	S. E. Wagaman.
Moore, Chas. Robert,	Altoona,	Pa.	G. A. Weston.
Moore, Fred. Smith,	Wilmington,	Del.	Z. James Belt.
Morgan, Clayton Edward,	Philadelphia,	Pa.	Frank E. Morgan.
Morron, George Shattuck,	New Lisbon,	O.	J. S. Marquis.
Morse, Thomas C.,	Montgomery,	Ala.	H. Gray Eakin.
Mountaine, Wm. Lewis,	Bangor,	Me.	L. L. Alden & Co.
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Musser, Frank Milburn,	Lewistown,	Pa.	A. P. Martin.
Nailor, Elmer Byard,	Wilmington,	Del.	Willard E. Smith.
Nebel, Charles William,	Philadelphia,	Pa.	C. B. Hunterson.
Nesbitt, Arthur Ettinger,	Philadelphia,	Pa.	Jas. A. Jeffries.
Norman, John Franklin,	Wesson,	Miss.	S. P. Bloom.
Notley, William T.,	Port Deposit,	Md.	W. O. Thompson, M.D.
O'Donnell, David Howard,	York,	Pa.	B. S. Gilbert & Co.
Page, Edward Lewars,	Lancaster,	Pa.	C. A. Heinitsh, Ph.M.
Parry, Edward,	Wales,	Great Britain,	Dr. Kinsinger.
Parry, Wm. Hough,	Newton,	Pa.	H. S. DeKalb.
Parvin, John Pearson,	Reading,	Pa.	W. F. Potteiger.
Pasold, Julius Martin,	Joliet,	Ill.	Adolph Poehner.
Pearce, Samuel Robert,	Manasquan,	N. J.	A. Blair.
Peck, Wm.,	Nottingham,	England,	A. R. Hesske.
Peiffer, Chas. Oscar,	Folsom,	Pa.	Dr. A. R. Norton.
Phillips, Robert Craig,	Burlington,	N. J.	W. A. Strode.
Pierce, Herman Judson,	Troy,	Pa.	R. F. Redington.
Pierce, John Gray,	Sanford,	Pa.	
Pierson, Wm. Harry, Jr.,	Wilmington,	Del.	J. S. Beetem.
Pipes, Wm. Henry,	Millington,	Md.	
Post, Edward Meigs,	South Seaville,	N. J.	A. S. Buchanan.
Praul, Walter Francis,	Philadelphia,	Pa.	J. H. Masholder.
Preston, Gilbert Kent,	Philadelphia,	Pa.	Wm. Procter, Jr., Co.
Prosser, Thomas Moyer,	Hellertown,	Pa.	M. S. Apple.
Pulsifer, Jas. Perlie,	Lakewood,	N. J.	C. A. Bye.

Name.	*Place.*	*State.*	*Preceptor.*
Punt, Arnold Anthony Joseph,	Philadelphia,	Pa.	W. H. Pile & Son.
Purté, John Aldred,	Ocean Grove,	N. J.	H. L. N. Purté, M.D.
Quatman, J. Henry,	Philadelphia,	Pa.	C. Aug. Werckshagen.
Ranck, Chas. Watkins,	Philadelphia,	Pa.	John W. Ranck.
Rantz, John,	Sadow,	Russia.	Emanuel Lupin.
Read, Joseph Corson,	Fernandina,	Fla.	J. Barclay Hall.
Reed, Arthur,	Pillow,	Pa.	Thos. Hetherington.
Reed, Geo. Oliver,	Bridgeville,	Del.	B. L. Brown.
Reese, John Bull,	Centralia,	Pa.	Geo. W. Davis.
Reeve, James Whitaker,	Bridgeton,	N. J.	Reeve & Fithian.
Reilley, Isabella Buist,	Philadelphia,	Pa.	
Remaly, George Joseph,	Easton,	Pa.	Weaver & Solliday.
Remmel, George Swartz,	Port Royal,	Pa.	F. Ross Harner.
Rewalt, Jay William,	Middletown,	Pa.	J. W. Rewalt.
Rich, Benj. Howard,	Bellefonte,	Pa.	W. C. Keplinger & Co.
Richardson, Neafie,	Rio Grande,	Pa.	J. P. Frey.
Ridpath, Robert Ferguson,	Jenkintown,	Pa.	J. W. Ridpath.
Rieben, Ernest,	Philadelphia,	Pa.	P. H. Gallaschick.
Ritter, Erwin Sterner,	Richlandtown,	Pa.	Smith, Kline & French Co.
Ritter, Wm. Joseph,	Philadelphia,	Pa.	Geo. Bille.
Roach, Charles Pettee,	Driftwood,	Pa.	W. H. Roach.
Robbins, Edward Cruise,	Haleyville,	N. J.	F. G. Thorman.
Roberts, Edward Roscoe,	Gatesville,	N. C.	
Roberts, Wm. Henry,	Utica,	N. Y.	J. H. Sheehan & Co.
Robertson, Henry Edward,	Philadelphia,	Pa.	Shinn & Baer.
Robno, Pinkas,	Kieff,	Russia.	E. Lupin.
Rochell, Harry Birch,	Philadelphia,	Pa.	W. A. Rumsey.
Rooney, James Peter,	Pittston,	Pa.	Wm. Webber.
Ross, Annie Catharine,	Philadelphia,	Pa.	J. L. Supplee.
Ross, Frank Budd,	Vincentown,	N. J.	F. S. Hilliard.
Roth, Francis John,	Lund,	Sweden,	F. L. Brown.
Rothberg, Elizabeth,	Charzoff,	Russia,	D. D. A. Modell.
Rutherford, John Burton,	Philadelphia,	Pa.	Chas. A. Rutherford.
Ryland, Geo. Bertram,	Grantsville,	Md.	J. B. Copland.
Sallada, Hunter,	Ashland,	Pa.	L. C. Voshage.
Sanders, Joseph Oliver,	Mifflinburg,	Pa.	T. E. Hickman.
Sayforth, Julius,	Leavenworth,	Kan.	Jas. F. Ross.
Schad, Harry John,	Tamaqua,	Pa.	L. J. Steltzer.
Schaffer, Charles Abraham,	Berlinsville,	Pa.	J. A. Wiegner.
Schembs, Peter Joseph,	Philadelphia,	Pa.	I. H. Bailey.
Schiebel, Jacob Wm., Jr.,	Scranton,	Pa.	W. B. Pier, M.D.
Schindel, David Philip,	Hagerstown,	Md.	Samuel F. Schindel.
Schmieg, Joseph Alphonse,	Philadelphia,	Pa.	H. D. Stechter.
Schneider, Kingsley Clark	Thompson, Berea,	O.	Noble & Stone.
Schnurman, Henry Samuel,	Allentown,	Pa.	J. W. Shoemaker & Co.
Schroeder, Johann Heinrich,	Cincinnati,	O.	L. N. Bérubé.
Scott, Emma Love,	Richmond,	Va.	S. Hayhurst, M.D.
Scott, Thornton T. B.,	Philadelphia,	Pa.	J. R. Smyser.
Sebring, James Woods,	Bellefonte,	Pa.	F. Potts Green.
Sellers, Walter Spangler,	Chambersburg,	Pa.	Cressler & Keefer.
Semmel, Franklin Peter, Jr.	Lehighton,	Pa.	C. T. Horne, M.D.
Sharp, Warren Reed,	West Chester,	Pa.	A. B. Hammond.
Shaw, John Thomas,	Philadelphia,	Pa.	Joseph Crawford.
Sherwin, Robert Southers,	Scranton,	Pa.	C. Henwood & Co.
Shissler, Edwin Ira,	Philadelphia,	Pa.	W. H. Galbraith.
Simpler, Willard Eugene,	Philadelphia,	Pa.	W. J. Jenks.
Slobodkin, Rose,	Minsk,	Russia,	Woman's Hospital.
Smiley, Geo. Washington,	Philadelphia,	Pa.	E. R. Smiley, M.D.
Smiley, Laura Margaret,	Philadelphia,	Pa.	E. R. Smiley, M.D.
Smith, Cyrus Edward,	Philadelphia,	Pa.	H. A. Smith.

Name.	*Place.*	*State.*	*Preceptor.*
Smith, Justin Towne,	Windsor,	Vt.	W. A. Rumsey.
Smith, Paul,	New Berlin,	Pa.	R. Shoemaker & Co.
Smith, Thos. Brown,	Swedesboro,	N. J.	E. H. Fahey.
Snyder, Benj. Crawford,	Philadelphia,	Pa.	
Snyder, Harry Lamar,	South Easton,	Pa.	A. Spengler.
Spath, Geo. Balthaser,	Dillsburg,	Pa.	H. W. Fishell, M.D.
Spence, Wm. Arthur,	N. Clarendon,	Pa.	A. W. Storey.
Spidel, Frank Myers,	Bedford,	Pa.	Dr. Macfarland.
Stadelman, Herman R.,	Ardmore,	Pa.	H. M. Davis.
Stahl, Joseph Bowers,	Philadelphia,	Pa.	Bullock & Crenshaw.
Stanton, John Emmet,	Swatara,	Pa.	H. F. Rhoads, M.D.
Steadman, Merril Linn,	Mifflinburg,	Pa.	
Steiner, Stewart Banks,	South Easton,	Pa.	Allen Spengler.
Stephens, Halsey DeForest,	Seaville,	N. J.	J. M. Ridge, M.D.
Stern, Wilson Clinton Ammon,	S. Bethlehem,	Pa.	D. Bruce Richards.
Stevens, Thos. Ray,	Bethlehem,	Ind.	H. B. Morse.
Stillwagon, Oscar Hulet,	Ambler,	Pa.	Jos. S. Angney, Jr.
Stine, Howard F.,	Mt. Carmel,	Pa.	A. S. Jordan & Co.
Stommel, Henry Aloysius,	Doylestown,	Pa.	E. M. Boring.
Stradley, Harry Benninghove,	Wilmington,	Del.	B. R. Veasey, M.D.
Strayer, Otho O'Burn,	Philadelphia,	Pa.	R. C. Cadmus.
Stroud, Allan Ward,	Phœnixville,	Pa.	J. B. Van Dyke.
Stroup, Freeman Preston,	Rouseville,	Pa.	W. C. Tyler, M.D.
Stump, Adam Franklin Marshall,	Womelsdorf,	Pa.	G. W. Ammon.
Swainbank, Chas. Miller,	Wilkes-Barre,	Pa.	H. H. Swainbank.
Swinehart, Daniel Harrison,	Pottstown,	Pa.	L. I. Shuler.
Taggart, George Cole,	Emporium,	Pa.	L. Taggart.
Thomas, Frank Benjamin,	Johnstown,	Pa.	Curt. G. Campbell.
Thomas, Howard Elwood,	Philadelphia,	Pa.	H. F. Rhoads.
Thorley, Alferetta May,	Harrisburg,	Pa.	
Thornton, Michael Thomas,	Ashland,	Pa.	J. V. Antill, M.D.
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Tinsman, Edward Walker,	Williamsport,	Pa.	J. Miles Yost.
Tobias, Herbert,	Canal Winchester,	O.	
Toelke, Charles,	Philadelphia,	Pa.	Frank E. Morgan.
Towles, Therret Rankin,	Henderson,	Ky.	J. L. Baldauf.
Townsend, James Vaughan,	Atlantic City,	N. J.	H. B. Leeds.
Trein, Chas.,	Easton,	Pa.	Chas. Shivers.
Troxell, Frederick Bethelier,	Lock Haven,	Pa.	Fetters & Hertel.
Troxell, John Oscar Peter,	Allentown,	Pa.	A. L. Dix, M.D.
Truax, Robert Severson,	Dover,	Del.	Burton & Sypherd.
Twist, Oliver,	Trenton,	N. J.	Oscar Davison.
Tyson, Warren Sunderland,	Norristown,	Pa.	Atwood Yeakle.
Urich, Mark Spangler,	Myerstown,	Pa.	I. S. Schmehl.
Vernon, Harold Gilmour,	Clifton Heights,	Pa.	G. R. Vernon, M.D.
Wagner, Chas. Henry,	Ashland,	Pa.	A. Shoenberger.
Waldner, Paul Jacob,	Philadelphia,	Pa.	W. G. Toplis.
Wasley, Frederick Stanley,	Shenandoah,	Pa.	H. M. Wasley.
Watkins, Mack McInnis,	Mosspoint,	Miss.	O. Eastland.
Watson, Jonathan Ingham,	Lambertville,	N. J.	S. W. Cochran & Co.
Watson, Joseph Shaffer,	Mt. Holly,	N. J.	W. Simes & Son.
Waugh, Wm. Alexander,	Clinton,	N. Y.	E. G. Bissell.
Webb, Horace Gilbert,	Norristown,	Pa.	Wm. H. Campbell.
Weida, Chas. Arthur,	Reading,	Pa.	J. B. Raser.
Weiss, Henry Beale,	Philadelphia,	Pa.	Bullock & Crenshaw.
Weiss, Wm. Erhard,	Canton,	O.	Fisher & Young.
Weitzell, Sue C.,	Greensburg,	Pa.	S. Hayhurst, M.D.
Wells, James Ralston,	Philadelphia,	Pa.	Bullock & Crenshaw.
Wentzler, Hartman Gotthard,	Muncy,	Pa.	Chas. Ouram.
Wermer, Harvey Eugene,	Allentown,	Pa.	S. G. Bushey.

Name.	*Place.*	*State.*	*Preceptor.*
West, Morris Fussell,	Kemblesville,	Pa.	F. E. West, M.D.
Weston, Edythe,	Wilmington,	Del.	May Reynolds.
White, Edward R.,	Wilkes-Barre,	Pa.	W. D. White.
Whitman, Wm. James,	Philadelphia,	Pa.	C. H. Bahl, M.D.
Wiegner, Chas. Wm.,	Slatington,	Pa.	J. A. Wiegner, deceased.
Wild, George Frederick,	Logansport,	Ind.	D. E. Pryor.
Wilson, Bryant Braid,	Atlantic City,	N. J.	C. K. Harris.
Wilson, Oliver Fawcett,	Pittsburg,	Pa.	F. W. E. Stedem.
Winger, John Bowman,	Norristown,	Pa.	O. F. Lenhardt.
Wismer, Isaac Gross,	Philadelphia,	Pa.	E. T. Spencer.
Witmer, Daniel Oburn, Jr.,	Taylorville,	Ill.	J. White.
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Woltman, Enos Frederick,	York,	Pa.	B. S. Gilbert & Co.
Yates, John Julius, Jr.,	Wilmington,	Del.	H. K. Watson.
Young, Asa Harvy,	Easton,	Pa.	Nebus & Richards.
Young, Benj. Lee,	Birmingham,	Ala.	Ellis Drug Company.
Young, James Humphrey, Jr.,	Philadelphia,	Pa.	R. C. Cadmus.
Zentner, Wm. Herman,	Chicago,	Ill.	Lapp Drug Company.
Zullinger, Aaron Henry,	Chambersburg,	Pa.	Greenawalt Bros.

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Armstrong, Walter,	Shenandoah,	Va.	L. C. Funk.
Armstrong, William Edward,	North Adams	Mass.	Special Chemistry.
Arndt, Harry,	Manheim,	Pa.	H. F. Ruhl.
Baddour, Joseph Selim,	Cairo,	Egypt,	Dr. S. Baddour.
Bailey, John,	Dover,	Del.	A. F. Merrell& C o.
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Bolton, Alfred Harrison, Jr.,	Philadelphia,	Pa.	A. H. Bolton.
Booth, James Lofton,	Biloxi.	Miss.	R. C. Cadmus.
Booth, Wm. Henry,	Danville,	Va.	John L. Hagan.
Boyd, Roger,	Atlanta,	Ga.	Geo. F. Payne.
Boyer, John Clinton,	Loyalton,	Pa.	H. C. Eddy.
Brendel, Frederick Chas.,	Zanesville,	O.	Henry Mueller.
Brockman, Frank William,	York,	Pa.	Dale, Hart & Co.
Brooks, Joseph Warren,	Pensauken,	N. J.	Bullock & Crenshaw.
Brunhouse, Frederick, Jr.,	York,	Pa.	Wm. Smith & Co.
Bucher, Wm. Lewis,	Columbia,	Pa.	Shinn & Baer.
Bundy, Clinton Thomas,	Barnesville,	O.	Geo. W. Goldsmith.
Butz, Newton,	Wescotville,	Pa.	A. Weber.
Brunier, Geo. Franklin,	Philadelphia,	Pa.	B. N. Bethel.
Caffrey, John Boniface,	South Bethlehem,	Pa.	H. C. Watt.
Cain, Maude Florence,	Lancaster,	Pa.	C. A. Heinitsh.
Campbell, Andrew,	Williamsport,	Pa.	Duble & Cornell.
Carman, Harry Alfred,	Philadelphia,	Pa.	Shoemaker & Busch.
Carpenter, Edward Albert,	Plano,	Tex.	W. L. Matthews.

Name.	*Place.*	*State.*	*Preceptor.*
Long, James Grier,	Coatesville,	Pa.	E. E. Wilson, M.D.
Long, Wm. Wilson,	Lewisburg,	Pa.	Geo. B. Evans.
Lorenz, Chas. Gustav,	Philadelphia,	Pa.	L. C. Funk.
Loveland, Prescott Raymond,	Baltimore,	Md.	B. Kent.
Luburg, Leon Franklin,	Philadelphia,	Pa.	G. H. Jackson.
Lutz, Walter Preston,	Salem,	N. J.	H. Grey Eakin.
McCanna, John Milton,	Columbia,	Pa.	G. V. Eddy.
McCloskey, Wilson Cathcart,	Curwensville,	Pa.	J. R. Irwin.
McConomy, Paul Lucien,	Philadelphia,	Pa.	E. F. Kessler.
McCormick, Alexander,	Philadelphia,	Pa.	W. E. Lee.
McFadden, Thos. Francis Joseph,	Greely,	Neb.	J. J. McFadden, M.D.
McGhee, Saylor John,	Beech Creek,	Pa.	H. G. Shinn.
McMeekan, Chas. Jas. Harvey,	Philadelphia,	Pa.	H. Duffield, M.D.
McNair, Wm. Righter,	Hazleton,	Pa.	McNair & Hoagland.
McNeil, Thos. Hunter,	Philadelphia,	Pa.	R. C. McNeil.
Macfee, Thos. Duncan,	New Glasgow,	N. S.	C. A. Eckels.
Mader, Elias,	Lebanon,	Pa.	E. H. Gingrich.
Malsbury, Hillman Gaskill,	Pemberton,	N. J.	J. W. Merritt.
Manko, Emanuel,	Philadelphia,	Pa.	Bullock & Crenshaw.
Martin, Samuel E.,	New London,	Pa.	Self.
Mathews, Wm. Joseph,	St. Clair,	Pa.	J. W. Pechin.
Mayhew, Chas. Holmes,	Bridgeton,	N. J.	Wm. Brewer.
Melick, Ralph La Shelle,	Sunbury,	Pa.	R. L. Melick.
Meredith, Chas. Howard,	Media,	Pa.	W. E. Dickeson.
Michener, Elmer David,	Duncannon,	Pa.	H. C. Watt.
Miller, Albert T.,	Philadelphia,	Pa.	Jno. Buckman.
Miller, Chas. Glanz,	Easton,	Pa.	A. J. Odenwelder.
Miller, Harper Guiley,	South Easton,	Pa.	Aaron Spangler.
Miller, James Augustus,	Eddyville,	Ia.	W. A. Alexander.
Miller, Roshier W.,	Honey Brook,	Pa.	C. G. Treichler.
Minton, Henry McKee,	Philadelphia,	Pa.	C. A. Eckels.
Mitchell, Albert Tippett,	Newton,	Pa.	John Ogden & Co.
Moleen, George Arnold,	Denver,	Col.	A. J. McAllister.
Moore, George Cooper,	Felton,	Del.	J. V. Slaughter.
Moosbrugger, Chas. Otto,	Dayton,	O.	Geo. Latin.
Morris, Max,	Atlanta,	Ga.	John Ingalls.
Mosebach, Ferdinand Adam,	Bethlehem,	Pa.	G. H. Ochse.
Moyer, Ralph Rodes,	Philadelphia,	Pa.	French, Cave & Co.
Mueller, Chas. August,	Philadelphia,	Pa.	A. G. Keller.
Murphy, Michael Chas.,	Plymouth Meeting,	Pa.	Cornelius Moylan.
Musselman, Morris Myers,	Gettysburg,	Pa.	J. M. Stoever.
Myers, John Henry,	Mechanicsburg,	Pa.	R. P. Long, M.D.
Myers, Wm. Henry,	Marietta,	Pa.	Lewis Trupp.
Naly, Sarah Lusan,	Mt. Pleasant,	Pa.	S. Hayhurst, M.D.
Neville, Wm.,	Conshohocken,	Pa.	
Nickum, James Weller,	Salt Lake City,	Utah,	J. D. Lisle, M.D.
Nugent, Thomas Francis,	Utica,	N. Y.	J. H. Sheehan & Co.
Parke, John Siter,	Philadelphia,	Pa.	C. H. Tatem.
Parker, Howard Eugene,	Wallingford,	Conn.	A. B. Pixley.
Pazmiño, Francisco,	Machale, Ecuador,	S. A.	I. Cohen.
Peabody, William Legoria,	St. Louis,	Mo.	W. R. Grant.
Pellett, Edmund Burnham,	Scranton,	Pa.	R. W. Cuthbert.
Pennell, Jerome Chester,	Bridgeton,	N. J.	J. L. Supplee.
Peterson, Wm. Vickerstaff,	Philadelphia,	Pa.	C. W. Shull.
Phillips, Oscar Wilson,	Caldwell,	O.	W. H. Bowron.
Phillips, William Newton,	Zanesville,	O.	A. J. Kendig.
Pierson, Alfred M.,	Vineland,	N. J.	Bidwell & Co.
Pilgrim, John W.,	Bridgeton,	N. J.	A. W. Cochran.
Porter, John Morris,	Philadelphia,	Pa.	F. S. Hughes.
Porter, William Edgar,	Meadville,	Pa.	F. K. Easterwood.

Name.	*Place.*	*State.*	*Preceptor.*
Portser, Charles Harry,	Saltsburg,	Pa.	H. C. Watt.
Powell, Charles Deitz,	Coatesville,	Pa.	W. C. Thompson.
Quick, Benj. Chamberlain,	Port Jervis,	N. Y.	S. St. John.
Rabenau, Arwed Gustav,	Dresden,	Germany,	Dr. J. R. Angney.
Randolph, Thomas Owen Fitz,	Versailles,	O.	T. M. Newbold.
Rectenwald, Louis Aloysius,	Pittsburg,	Pa.	F. H. Eggers & Son.
Regar, Daniel Scheaffer,	Denver,	Pa.	Theo. Doench.
Reich, Solomon Miller,	Wheeling,	W. Va.	E. Bocking.
Richman, Edward Milton,	Deerfield Street,	N. J.	G. B. Evans.
Ricker, William Homer,	Hummelstown,	Pa.	C. R. Myers.
Ridenour, William Edward,	Springfield,	O.	J. D. Lisle.
Ridgway, Wm. Frederick,	Seattle,	Wash.	G. Omar Guy.
Ritter, Frederick William,	Middleport,	Pa.	George Holland.
Robbins, George Delbert,	Evansville,	Ind.	W. A. Lowenthal.
Robinson, Raleigh,	Hatboro,	Pa.	W. T. Robinson.
Rock, Peter Joseph,	Sutton,	Neb.	P. Niskey.
Rogers, John Wilson,	Independence,	Mo.	C. J. Gebauer.
Rothwell, Walter,	Hatboro,	Pa.	J. W. Frey.
Russell, Benjamin Alden,	Ilion,	N. Y.	Ogden & Downs.
Sager, Verner Edward,	North Bristol,	O.	Andrew Blair.
Sallade, Raymond Ellwood,	Womelsdorf,	Pa.	Frank T. Landis.
Sames, Joseph Howard,	South Bethlehem,	Pa.	S. Rau & Co.
Saybolt, George Henry,	Philadelphia,	Pa.	W. E. Supplee & Bro.
Schabinger, Charles,	Felton,	Del.	Wm. Harris.
Schaeffer, Otis Oliver,	Middletown,	Pa.	R. T. Blackwood.
Schmalzreidt, Frederick,	Philadelphia,	Pa.	W. R. Warner & Co.
Schmitt, Albert Herman,	Los Angeles,	Cal.	R. W. Maris.
Schrack, Robert Franklin,	Philadelphia,	Pa.	W. S. Young.
Schumann, August Frank,	Philadelphia,	Pa.	P. G. A. Weber.
Scott, James Patrick Edward,	Philadelphia,	Pa.	E. J. Finnerty.
Seiple, Harry Bertram,	Philadelphia,	Pa.	L. Seiple.
Semple, Henry Beidleman,	Easton,	Pa.	H. B. Semple & Son.
Semple, John,	Upland,	Pa.	O. P. Hooper.
Shenk, John Benjamin,	Derry Church,	Pa.	W. G. Toplis.
Shoemaker, Clinton Llewellyn,	Allentown,	Pa.	Fred. Seitz, M.D.
Shreve, Alexander,	Wrightstown,	Pa.	Machall Bros. & Flemer.
Shreve, Alex. Ross,	Philadelphia,	Pa.	M. M. Osmun, M.D.
Simonis, Otto,	Philadelphia,	Pa.	W. A. Rumsey.
Simons, Harry Fisher,	Philadelphia,	Pa.	D. C. Lyman.
Sisler, Loerey Wm.,	Bridgeport,	Pa.	F. P. Rutherford.
Skay, Edward Joseph,			Special Chemistry.
Skinner, Harry Wharton,	Chambersburg,	Pa.	Cressler & Keefer.
Slifer, Leo Engelman,	Philadelphia,	Pa.	W. H. Ziegler.
Smith, Chas. Hye,	Harrington,	Del.	W. H. Farley.
Smith, John Ritner,	Harrisburg,	Pa.	F. E. Morgan.
Smith, Rodney,	Saegertown,	Pa.	S. S. Collom.
Spotts, Albert Oyster,	Newport,	Pa.	T. E. Conard, M.D.
Stahel, Albert Wm.,	Boscobel,	Wis.	H. B. Morse.
Stephen, Annie Rex,	Reading,	Pa.	W. L. Stephen.
Stephen, Walker Lewis,	Reading,	Pa.	J. R. Elfreth.
Stern, Charles Wilson,	Smyrna,	Del.	R. J. Burton.
Stout, Edward Clayton,	Philadelphia,	Pa.	G. C. Devine, M.D.
Streeper, Austin,	Norristown,	Pa.	H. R. Stallman.
Strickler, George, Jr.,	Lebanon,	Pa.	S. H. McGowan.
Stuart, Rob't Cummings,	Houston,	Tex.	G. W. Heyer.
Swartz, Calvin I.,	Wilmington,	Del.	J. S. Beetem.
Swartz, Edward,	Hughesville,	Pa.	L. M. Swartz.
Sykes, Wm. Willard,	Norristown,	Pa.	J. B Hall.
Tarr, Robert H.,	Cleveland,	O.	M. G. Tielke.
Taylor, George Frederick,	Philadelphia,	Pa.	Thomas Craighead.

Name.	*Place.*	*State.*	*Preceptor.*
Terne, Henry B.,	Philadelphia,	Pa.	Bullock & Crenshaw.
Terry, John Herman,	Plano,	Tex.	J. M. Fronefield.
Test, Ellwood Allen,	Philadelphia,	Pa.	J. H. Kerr.
Thayer, Guy Parker,	Garrettsville,	O.	C. W. Williams & Co.
Thayer, Houston Talbot,	Chattanooga,	Tenn.	Special Chemistry.
Thompson, Alex. Peterson,	Philadelphia,	Pa.	W. L. Cliffe.
Thompson, Nathan Lincoln,	St. Johnsbury,	Vt.	C. C. Bingham.
Thornton, Thomas Redman,	Union Point,	Ga.	E. F. Kessle.
Thrush, Morris Clayton,	Charlestown,	W. Va.	Light & Watson.
Ulrich, Julius Hirsch,	Peoria,	Ill.	W. M. Benton.
Unangst, Harvey Edgar,	Easton,	Pa.	O. F. Zaccherle, M.D.
Van Korb, Wm.	Amsterdam,	N. Y.	G. H. Ingraham, M.D.
Waters, Thos. Carey,	Stroudsburg,	Pa.	J. S. Brown.
Watson, Walter Wilmer,	Lancaster,	Pa.	D. B. McCleary, M.D.
Weakley, Chas. Carpenter,	Media,	Pa.	Geo. Holland.
Weaver, Wilmer John,	Strasburg,	Pa.	D. G. E. Musselman.
Webb, John Karl,	McComb,	Miss.	J. A. Beard.
Webbert, Harry Sigler,	Mechanicsburg,	Pa.	J. H. Boyer, M.D.
Weber, Howard Elmer,	Mahanoy City,	Pa.	M. R. Stein.
Weiser, Spencer Bircher,	Millersburg,	Pa.	F. R. Weiser, M.D.
Welsh, Robt. Emmet,	Altoona,	Pa.	G. A. Weston.
Wetzel, Samuel,	Carlisle,	Pa.	W. T. Horn.
Whitacre, Lewis Reese,	Mt. Holly,	N. J.	Elmer D. Prickett.
Whiteley, Edward Albert,	New Hope,	Pa.	Geo. M. Shamalia.
Whitely, John Campbell,	Goderick,	Ont.	W. C. Goode.
Whittem, Wm. Henry,	Chestnut Hill,	Pa.	Wm. A. Whittem.
Wilson, Willets,	Ithaca,	N. Y.	McClure & Fisher.
Winch, Howard Geo.,	Bethlehem,	Pa.	S. Rau & Co.
Winger, David Zwingle,	Claylick,	Md.	J. K. Waters, M.D.
Woods, Samuel Ross,	Dundas,	Ont.	H. W. Ralph.
Woolley, Washington Irving,	Ocean Grove,	N. J.	S. D. Woolley.
Wyatt, John Congle,	Portland,	Ore.	O. P. S. Plummer, M.D.
Yaple, Florence,	Chillicothe,	O.	Susan Hayhurst.
Young, Geo.,	Johnstown,	Pa.	Chas. Young.
Young, Warren Ray,	Lykens,	Pa.	A. G. Stanley.
Zeigler, John Clayton,	York,	Pa.	B. L. Gilbert.
Zipp, Chas. James,	Utica,	N. Y.	W. A. Teachout.
Zook, John Noah,	Coatesville,	Pa.	Geo. W. Davy.

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